



2022 Operations and Monitoring Report

For the Upland Original and New Landfills

Northwin Environmental and the Ministry of Environment and Climate Change Strategy

March 31, 2023

→ The Power of Commitment

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1. Introduction

GHD has been retained by Northwin Environment Ltd. (Northwin) to prepare this 2022 Annual Operations and Monitoring Report (Annual Report) for the Upland Original Landfill and New Landfill located at 7295 Gold River Highway (Site) approximately 7 kilometres (km) west of Campbell River, British Columbia (BC) city centre. A Site location map is provided as Figure 1. The landfill is operating under the Operational Certificate 107689 (OC 107689), which was issued to Upland Excavating Ltd. (Upland) on August 1, 2019, and an amendment received on April 26, 2022. A copy of the OC and the amendment is provided in Appendix A. The Site is owned by Upland. The landfill is operated by Northwin.

This Annual Report provides a summary of the landfill operations carried out on Site and the results of the environmental monitoring plan (EMP) implemented from January 1 to December 31 of 2022 (Reporting Period). An evaluation of the operational and environmental performance of the landfills are provided with recommendations made for the ongoing development of the landfills and the EMP.

This Annual Report has been written in accordance with the Landfill Criteria for Municipal Solid Waste (MOE, June 2016) and Section 5.4 of the OC.

1.1 Limitations

This report has been prepared by GHD for Northwin Environmental and the Ministry of Environment and Climate Change Strategy and may only be used and relied on by Northwin Environmental and the Ministry of Environment and Climate Change Strategy and the Ministry of Environment and Climate Change Strategy for the purpose agreed between GHD and Northwin Environmental and the Ministry of Environment and Climate Change Strategy as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Northwin Environmental and the Ministry of Environment and Climate Change Strategy arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited by the information provided by Northwin Environmental.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

1.2 Background

The Site is approximately 48 hectares in size and is accessed from the north via an entrance from Gold River Highway. In 2022, the Site encompasses a large sand and gravel pit (Pit), the Original Landfill, and Cell 1 East of the New Landfill. A Site Plan is provided on Figure 2.

Prior to the issuance of the OC, the Original Landfill operated under Permit PR-10807 (Permit). This Permit was issued for the Original Landfill on June 1, 1992. In accordance with the approved Comox Valley Regional District Solid Waste Management Plan (SWMP), Upland submitted an application in June 2015 to replace the Permit with a new Operational Certificate.

Prior to the issuance of the OC, annual water quality monitoring results were provided to the Ministry of Environment and Climate Change Strategy (the Ministry) in 2017 and 2018 in response to an e-mail request from the Ministry to Upland and GHD dated November 10, 2017.

The OC was issued on August 1, 2019, authorizing waste management at the Original Landfill and the New Landfill. On April 26, 2022, the OC was amended to include the acceptance of soil that is non-hazardous waste (IL+), a treated leachate holding pond or tank, and conditions related to the decommissioning of the Original Landfill and the Original Leachate Management Works.

1.3 Site Location

The Site is bound to the north by Gold River Highway (Highway 28), to the east by forested and industrial land parcels and to the west by Rico Lake, a construction storage yard, and an undeveloped industrial lot. The southern boundary of the Site is located on the Campbell River city limit. The area to the south is part of the Strathcona Regional District and includes land parcels used by the forestry industry. The legal description of the Site is Lot A, District Lot 85, Plan 30709, Sayward District.

1.4 Site Security

Signage is erected at the main entrance of the Site. The signage includes all information specified in Section 6.10 of the Landfill Criteria. In addition, there are four signs at property access points that read “Industrial Site, No Trespassing. Property Under Video Surveillance”. The surveillance cameras are monitored 24-hours a day by a security company. An outdoor lighting system also illuminates the Site at night.

2. Original Landfill Operations and Development

2.1 Original Landfill

The Original Landfill includes and 85 metres (m) by 85 m Original Lined Cell, a 7,000 square metres (m²) Original Un-Lined Cell, and leachate management works which are located near the southeast corner of the Site.

The OC authorizes waste discharge to the Original Lined Cell. Waste discharge to the Original Un-Lined Cell is not authorized.

The Original Lined Cell was constructed with two 20 mil Coated Woven Polyethylene (CWPE) liners and is equipped with a leachate collection system and a leak detection drainage layer composed of medium sand between the upper and lower liner. The leak detection drainage layer is equipped with a perforated pipe with a riser pipe that extends to ground surface, which may be used for water level monitoring and extraction of the contained water, if required.

Waste was not discharged to the Original Lined Cell in 2022. The landfill was covered by a tarp until November 2022 when decommissioning activities began. Two batches (37.9 m³) of leachate were transferred to the New Landfill leachate management works for treatment in 2022.

2.2 Original Leachate Management Works

The treatment portion of the original leachate management works stopped being used once the new leachate management works started operating in late November 2022. The original leachate management works will be fully decommissioned in 2023.

In 2022, two batches (37.9 m³) of leachate were pumped to the New Landfill leachate management works (Section 3.2) for treatment.

2.3 Summary of OCP Implementation

A summary of the Operation and Closure Plan (OCP) components outlined in Section 2.3(b) of the OC that were implemented from January 1 to December 31, 2022 include:

- OCP was completed by a QP on behalf of Upland and submitted to the Ministry on October 4, 2019.
- Soil Acceptance Plan and Filling Plan: waste was not accepted for discharge to the Original Landfill in 2022.

- Cover Placement: A polyethylene tarp was placed over all areas of the landfill until decommissioning activities began in November 2022.
- Lifespan Analysis: refer to Section 2.6
- Stormwater Management Plan: operational berms continued to ensure that contact water remains within the lined cell and separate from the clean stormwater runoff. Clean stormwater continued to be directed away from the landfill for infiltration into the groundwater aquifer below the Site.
- Original Leachate Management Plan: works included leachate collection, extraction, and storage, as described in Section 2.2.
- Environmental Management Plan (EMP): the EMP described in Section 5 was implemented in 2022. Results of the EMP are presented in Sections 6 and 7.
- Operation Plan: The Original Landfill operated in accordance with the applicable operations section presented in the OCP.
- Closure Plan: The Closure Plan (Section 9 of the OCP) remained applicable since the Original Landfill began decommissioning in November 2022.
- Financial Security Plan: The financial security plan is provided in Section 11 of the OCP.
- Contingency Plan: EMP results indicate that downgradient groundwater concentrations are below CSR DW standards and so the contingency plan was not triggered.

2.4 2023 Significant Works

The significant works planned for 2023 at the Original Landfill include:

- Waste from the Original Landfill will be fully excavated and discharged to the New Landfill by April 2023. The plan to remove all waste from the Original Landfill, as presented in the DOCP, will be practiced. The associated reporting will also be submitted to the Ministry.

2.5 Waste Tonnage and Volume

Waste was not discharged to the Original Landfill in 2022.

2.6 Airspace Consumption, Remaining Volume, and Remaining Life

Using the 2019 to 2021 data, the remaining life for the Original Lined Cell is 3.0 years. Although the Original Lined Cell had capacity, waste was not accepted for discharge to the Original Lined Cell. Instead, waste was discharged to the New Landfill.

Table 2.1 Original Landfill Airspace Consumption, Remaining Volume, and Remaining Life

	Un-lined Cell (m ³)	Lined Cell (m ³)	Total Original Landfill (m ³)
Historical to Oct 4, 2019	35,000	4,446	39,446
Oct 5 thru December 31, 2019	0	5,445	5,445
January 1 thru December 31, 2020	0	7,812	7,812
January 1 thru December 31, 2021	0	4,464	4,464
January 1 thru December 31, 2022	0	0	0
Total Airspace Consumed	35,000	22,167	57,167
Total Capacity	35,000	39,746	74,746
Total Airspace Available	0	17,579	17,579
Remaining Life			3.0 years

2.7 Treated Leachate Effluent Quantity and Quality

In 2022, two batches (37.9 m³) of leachate from the Original Landfill were transferred to the New Landfill leachate management works for treatment.

2.8 Non-Compliance

According to Northwin, the Original Landfill was compliant with the conditions of the OC during the Reporting Period.

2.9 Public Complaints

According to Northwin, no public complaints were received during the Reporting Period.

3. New Landfill Operations and Development

3.1 New Landfill

Presently, the New Landfill includes two cells: Cell 1 East and Cell 1 West. Cell 1 West was constructed in 2022. Both cells include a double liner system, leak detection layer, and leachate management works (see Section 3.2), as shown on Figure 4.

Cell 1 East and Cell 1 West are comprised of a primary and secondary base liner. The primary base liner refers to the composite liner system that consists of an HDPE geomembrane liner and geosynthetic clay liner (GCL) which underlies the leachate collection system. The secondary base liner refers to the composite liner system which is comprised from an HDPE geomembrane liner and GCL which underlies the leak detection system.

The Cell 1 East and Ponds Construction Report was submitted to the Ministry on October 19, 2021. The New Landfill was authorized to accept waste 30-days following submission on November 19, 2021. The New Landfill (Cell 1 East) started accepting waste on November 24, 2021.

The New Landfill is authorized to accept C&D waste, landfill clearing waste, Industrial Quality soil (from January 1 to April 23, 2022), IL+ soil (as of April 24, 2022), and sludge from the leachate management works or water management works.

3.2 New Leachate Management Works

The new leachate management works include leachate collection, extraction, storage, treatment, and infiltration. A process schematic of the new leachate management works is provided in Figure 3.1 below.

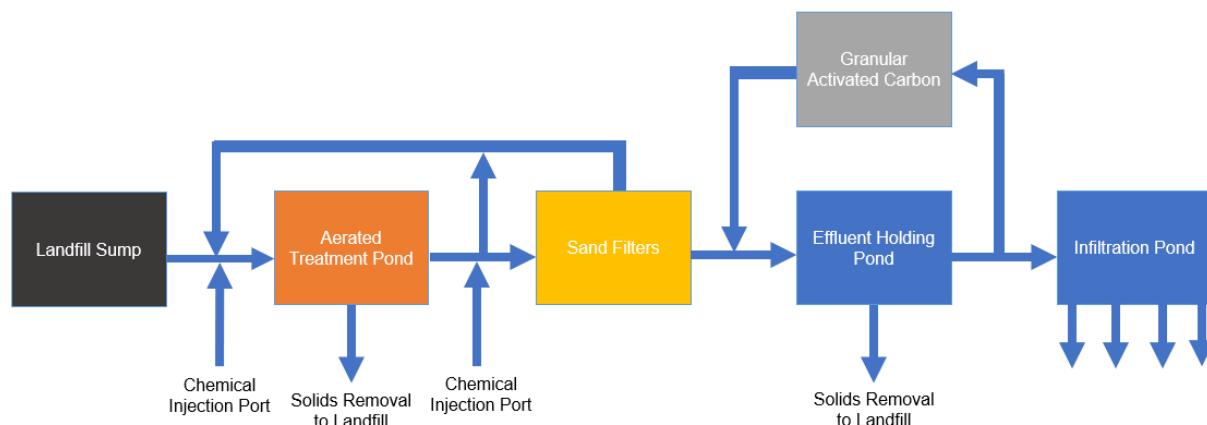


Figure 3.1 New Leachate Management Works Schematic

Leachate is collected within Cell 1 East (and stormwater from Cell 1 West) in a series of perforated pipes installed at the base of the cell and discharges to a sump. Leachate is stored temporarily in the landfill and pumped from the sump to the leachate treatment pond for batch treatment as shown in Figure 3.1, on an as-needed basis. The location of the sump is shown on Figure 4. The leachate treatment pond includes a primary and secondary liner, leak detection layer, and leak collection pipes.

To target operation of a weekly batch at the peak daily leachate generation rate, an average batch size is 625 m³, with the maximum batch size to be 1,400 m³. A batch size may vary, requiring operational adjustments to the treatment system.

The process begins with aerated equalization, where the aerated equalization pond is filled, and the aeration system on during the filling process. Following aeration, the leachate is pumped through pipes to the leachate treatment container, where chemicals can be added inline through injection ports. After chemical addition, leachate can be recirculated to the equalization pond or sent through a series of sand filters before entering the effluent holding pond. The effluent batch will be held in the effluent holding pond and sampled with a 3-day turnaround on the laboratory analysis. Following receipt of sample results, the batch will then be pumped to the infiltration pond or recirculated through the Granular Activated Carbon (GAC), if polycyclic aromatic hydrocarbons (PAHs) did not meet discharge criteria. During operations the batches will be tested periodically to confirm discharge criteria are being met. The treatment process will continue until treated effluent concentrations meet the BC CSR Schedule 3.2 DW standards.

3.3 Summary of DOCP Implementation

A summary of the DOCP components that were implemented in 2022, include:

- The DOCP was completed by a QP on behalf of Upland and submitted to the Ministry on July 8, 2021.
- Operations Plan: the New Landfill operated in accordance with the Site Operations section presented in the DOCP.
- Soil Acceptance Plan: soil was received in accordance with the soil acceptance plan presented in the DOCP and OC amendment. A GHD QP certified and submitted to Upland a document outlining at minimum the OC requirements under Section 2.7(b).
- Filling: waste was accepted according to the waste acceptance policy and discharged in Cell 1 East, including waste excavated from the Original Landfill. Waste was not discharged to Cell 1 West in 2022.
- Cover Placement: cover was placed over waste as a means of landfill nuisance control on an as-needed basis determined by landfill staff. Intermediate soil cover was placed on areas of the landfill that were not scheduled to receive the placement of additional waste for 30 days or more.
- New Leachate Management Plan: leachate management includes leachate collection, extraction, storage, and treatment. Leachate is extracted from the landfill by active pumping from the Cell 1 East for treatment as described in Section 3.2.
- New Surface Water Management Plan: perimeter berms around the cell prevent run-on of stormwater to the landfill footprint. Existing site ditches promote stormwater infiltration into the ground at the base of the Pit. Contact water is managed as leachate. Swales constructed in 2022 outside of the New Landfill gravity drains stormwater away from the footprint to the pit.
- Environmental Monitoring Plan: the EMP described in Section 5 was implemented in 2022. Results of the EMP are presented in Sections 6 and 8.
- Tigger Level Assessment Plan: leachate in the leak detection system triggered the contingency plan outlined in the DOCP. In 2022, the primary liner of Cell 1 East was repaired (see Section 8.2).
- Financial Security Plan: the financial security plan (revision 2) was completed on July 2, 2021, and submitted as part of the DOCP.

3.4 2023 Significant Works

The significant works planned for 2023 at the New Landfill include:

- The installation of the proposed monitoring well MW13.

- Submission of the Leachate Treatment System Commissioning Report to the Ministry following final commissioning of the Leachate Treatment System in 2023 as the leachate concentration from Cell 1 East stabilizes.
- Submission of the Cell 1 West construction report to the Ministry following the installation of the drainage blankets and leachate management works.

3.5 Waste Tonnage and Volume

In 2022, the New Landfill accepted a total 44,813 tonnes or 34,472 m³ of waste for discharge to Cell 1 East:

- 11,377 tonnes or 8,752 m³ of C&D waste
- 31,258 tonnes or 24,045 m³ of non-hazardous waste quality soil
- 1,932 tonnes or 1,486 m³ of asbestos containing material
- 225 tonnes or 173 m³ of creosote timbers

The recyclable material received included 5,235 tonnes of clean concrete, 537 tonnes of concrete with rebar, 4,229 tonnes of asphalt, and 1,327 tonnes of rubble.

No hazardous waste, controlled waste, and attractants were received in 2022.

Note that the conversion between waste tonnage and volume of C&D waste and soil was completed based on the average apparent density of 1.3 tonnes per m³ as outlined in the DOCP.

3.6 Airspace Consumption, Remaining Volume, and Remaining Life

As shown in Table 3.1, the maximum design capacity of Cell 1 East is 138,238 tonnes or 106,406 m³ using the average apparent density of 1.3 tonnes per m³. The total airspace consumption from January 1 to December 31, 2022 was approximately 44,813 tonnes or 34,472 m³. The remaining volume of Cell 1 East is 71,934 m³. The remaining volume for the New Landfill is 497,893 m³.

Using the maximum allowable discharge rate of 45,000 tonnes per year or 34,615 m³ per year, the remaining life for Cell 1 East is 1.6-years and the remaining life for the New Landfill 11.1-years. These values exclude the tonnages associated with the placement of waste from the Original Landfill. The Original Landfill tonnages will be determined following decommissioning and included in the 2023 annual report.

Table 3.1 *New Landfill Airspace Consumption, Remaining Volume, and Remaining Life*

	Cell 1 East (m ³)	Total New Landfill (m ³)
Jan 1 thru Dec 31, 2022	34,472	34,472
Total Capacity	106,406	532,365
Total Airspace Available	71,934	497,893
Remaining Life	1.6 years	11.1 years

3.7 Treated Leachate Effluent Quantity and Quality

In 2022, Northwin collected, treated, and discharged approximately 1,984 m³ of leachate including two batches of leachate from the Original Landfill. Treated leachate effluent was sampled throughout the year, as summarized in Table 3.2 below. The associated lab reports are included in Appendix C-1.

Table 3.2 *Treated Leachate Effluent Quality Analytical Summary*

Sample Date	Lab Report No.	Does Treated Leachate Effluent Meet CSR 3.2 Drinking Water Standards	Treatment Continued or Discharged
Feb 18 Feb 23	VA22A3490	-001: Sulfate, lithium, manganese, quinoline -002: Sulfate, quinoline	Treatment continued Treatment continued
Mar 29	VA22A6872	-001: Sulfate, manganese, quinoline	Treatment continued
Apr 11	VA22A7623	-001: Sulfate, manganese, quinoline	Treatment continued
Jun 7 Jul 1 Jul 29	VA22B2754 VA22B5020 VA22B7883	-001: Sulfate -001: Quinoline -001: no exceedances	Treatment continued Treatment continued Discharged
Jun 7 Jul 1	VA22B2754 VA22B5020	-002: Boron, lithium, sodium -002: no exceedances	Treatment continued Discharged
Nov 2	VA22C6839	-001: Sulfate, boron, sodium	Treatment continued
Nov 17*	C291540V4R	CXW-01: Sulfate, sulphide, boron, iron, manganese, quinoline, PFOS, PFOA	Treatment continued
Notes: * - All samples were collected by Northwin except on Nov 17 which was collected by GHD during the EMP event.			

3.8 Non-Compliance

According to Northwin, the New Landfill was compliant with the conditions of the OC during the Reporting Period.

3.9 Public Complaints

According to Northwin, no public complaints were received during the Reporting Period.

4. Site Physical Setting

The following section summarizes the Site setting with respect to climate, topography, stormwater drainage, geology, and hydrogeology.

4.1 Climate

Climate data was measured at Environment Canada's Campbell River Airport Climate Station (ID 1021261) located approximately 8 km southeast of the Site. Based on the available climate data, the area received 1094.2 millimetres (mm) of precipitation in 2022 with much of the rainfall occurring between November and January.

4.2 Topography and Drainage

The Site is located on a terrace that is partially surrounded by mountainous terrain to the south and southwest. The terrace gradually slopes towards the Quinsam River located approximately 3.8 km to the southeast of the east Site boundary. The Quinsam River channel is at an elevation that is greater than 100 m below the Site. There are no natural surface water courses on Site.

Drainage within the Original Landfill and New Landfill area is managed according to the stormwater management plan provided in the OCP and DOCP, respectively. Perimeter berms have been constructed around the landfill cells to ensure that precipitation that falls on the landfill footprints remains within the footprint and managed as leachate. Precipitation that falls outside of the landfill footprints is considered clean water and infiltrates into the groundwater aquifer below the Site.

4.3 Geologic Setting

Overburden

Based on regional geologic mapping, the area in the vicinity of the landfill underwent several periods of glaciation during the Pleistocene Epoch. Vancouver Island was glaciated with ice thicknesses to 2 km. During the recession of the last glaciation approximately 14,000 years ago, glacial and glacio-fluvial sediments were deposited, and in some cases reworked and redeposited, to make up many of the present surficial deposits of Vancouver Island. These deposits consist of till that was deposited directly by glacial activity¹ and of glacial outwash composed primarily of poorly sorted, coarse-grained sand and gravel sediments deposited by glacial melt water (Greene, Scoates, and Weis, 2005; McCammon, 1977)².

Based on investigations completed by GHD and Site operations, the surficial geology underlying the landfill is native interbedded sand and gravel with occasional seams of sand and silty sand. Directly underlying the landfill, this unit is greater than 40 m in thickness.

Bedrock

The Site is underlain by the Karmutsen Formation, which is part of the Wrangellia Terrane. The Karmutsen Formation consists mostly of submarine flood basalts up to 6 km in thickness.

Based on Site investigations completed by GHD, the bedrock underlying the landfill is competent igneous basalt. The surface of the bedrock is greater than 50 m below the ground surface in the Original Landfill area.

A bedrock ridge is present between Rico Lake and the Pit along the western limit of the Site. The presence of the ridge creates a surface water and groundwater flow divide. The approximate location of the watershed and groundwater flow divide is illustrated on Figures 5 and 6.

4.4 Hydrogeologic Setting

In general, the geologic units identified in the previous section may be grouped into the following two hydrogeologic units:

1. A sand and gravel overburden aquifer
2. Bedrock aquifer

An unconfined aquifer exists within sand and gravel overlying bedrock at the Site. In 2022, the water table was present approximately 38-42 m bgs in the vicinity of the Original Landfill and 12-17 m bgs in the vicinity of the New Landfill. Groundwater flow is interpreted to be from northwest to southeast, towards the Quinsam River. The head waters of the aquifer are from McIvor Lake in the vicinity of the Site.

This sand and gravel aquifer is a major aquifer in the region and is identified in the BC Water Resource Atlas (2017) as aquifer 975 IIA (10). This aquifer is interpreted to be the principal groundwater flow zone at the Site. In the context of the landfill, this aquifer represents the only receptor to landfill-related groundwater quality impairments.

GHD completed single well response tests (SWRT) at nine wells screened within the sand and gravel aquifer. The results of the SWRTs show that hydraulic conductivity of the sand and gravel aquifer is approximately 1.8×10^{-2} cm/sec.

¹ This till consists of larger clasts supported in a matrix of fine-grained sediment.

² Greene, A.R., J.S. Scoates and D. Weis, 2005. Wrangellia Terrane on Vancouver Island, British Columbia: Distribution of Flood Basalts with Implications for Potential Ni Cu PGE Mineralization in Southwestern British Columbia.

5. 2022 Environmental Monitoring Plan

This section presents the 2022 environmental monitoring plan (EMP), sampling methodology, laboratory program, quality assurance/quality control (QA/QC) program, and specification developed for the Original and New Landfill. The quarterly EMP for the New Landfill began in 2022. Monitoring locations are presented on Figures 5 and 6.

5.1 Monitoring Locations

The EMP was developed for the Site to assess and identify potential landfill derived impacts to the underlying aquifers, to monitor groundwater and surface water levels, and to evaluate Site regulatory compliance (Section 3.5 of the OC).

The EMP for the original landfill consists of semi-annual monitoring at groundwater, surface water, leachate, and the leak detection layer locations. The EMP for the new landfill consists of semi-annual monitoring of groundwater, surface water, leachate, and the leak detection layer locations, including landfill gas in soil monitoring, which occurs annually.

The objective of each component of the EMP's is provided below.

Groundwater

The objective of the groundwater monitoring plan is to detect the extent and magnitude of potential landfill-derived impacts to the underlying overburden aquifer and to monitor the groundwater flow direction across both landfills.

For the original landfill, groundwater quality is monitored at three upgradient (MW2-14, MW2A-16, MW3-14), one cross-gradient (MW10-17) and one downgradient well (MW11-19). Groundwater levels are monitored at 12 additional wells located across the Site.

For the new landfill, groundwater quality is monitored at five upgradient (MW6-17, MW9-17, MW1-14, MW4A-15, and MW4B-15), two cross-gradient (MW2-14 and MW2A-16) and four downgradient wells (MW10-17, MW12-22, MW11-19, and MW3-14). A proposed well, MW13, (Figure 4) will be part of the monitoring program once installed. Monitoring wells MW4A-15 and MW4B-15 were buried following the Q3 monitoring event during landfill construction.

Surface Water

Water levels in Rico Lake and McIvor Lake are monitored to assess the hydraulic relationship between these surface water bodies and the underlying aquifers. The water level surface elevation at Rico Lake is measured from a surface water gauge installed in the lake. The hydrometric surface of McIvor Lake is monitored by BC Hydro. GHD records the water level surface elevation from the publicly available BC Hydro Data Records. This occurs for both the original and new landfill.

Leachate

The objective of the leachate monitoring program is to characterize leachate quality generated within the lined cell of the Original Landfill and the New Landfill. At the Original Landfill, leachate is sampled from a leachate sump (S03-19) and a leachate access pipe (S05-19). At the New Landfill, leachate is sampled from a sump located in Cell 1 East (S06-21).

Treated leachate is also sampled from the New Landfill Infiltration Pond if Northwin is discharging treated leachate during the EMP event. The sample collection point (TLIP) is located at the end of the treated leachate discharge pipe/hose.

Leak Detection Layer

Leak detection layers are present in the Original Landfill Lined Cell and the New Landfill. Design variations exist across the leak detection systems; however, the systems are conceptually the same. A schematic of the leak detection layer in the Original Landfill is illustrated in Figure 5.1, below.

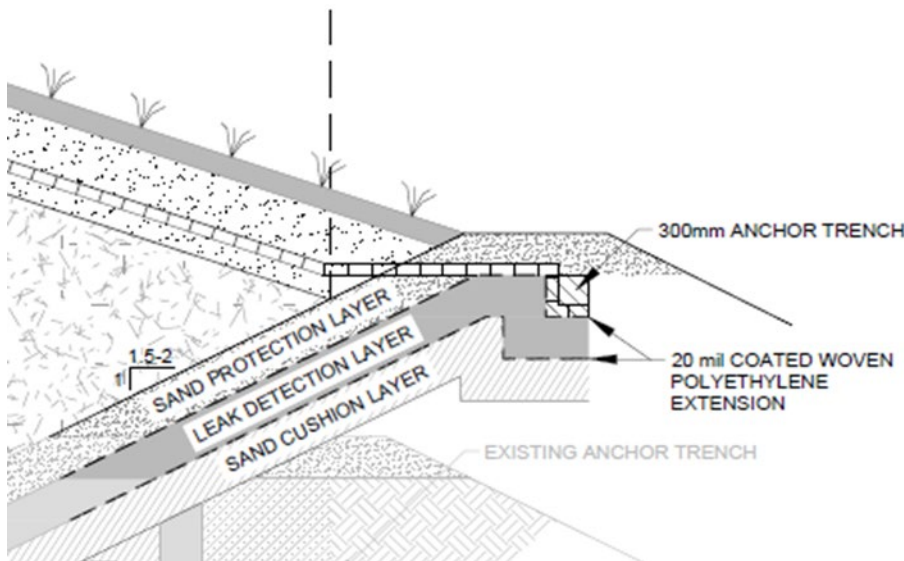


Figure 5.1 The Leak Detection Layer in the Original Landfill

Original Landfill: The objective of monitoring the leak detection layer is to assess the potential for leachate-derived alterations to occur below the upper liner (i.e., polyethylene extension) of the lined cell. Water within the leak detection layer is monitored at S01-17.

New Landfill: The objective of monitoring the leak detection layer is to assess leakage of the primary liner. Water in the leak detection layer is monitored at the leak detection access pipe (LDS).

Landfill Gas in Soil

The objective of monitoring landfill gas in soil is to assess its migration from the New Landfill towards the nearest receptors (i.e., workers) who are working in the buildings near the front entrance of the site. Landfill gas in soil is monitored at two probes (LFG1-22 and LFG2-22).

5.2 EMP Specifications

The EMP Specification for the Original Landfill and the New Landfill is presented in Appendix B. Each specification includes monitoring locations, frequency, and analytical parameters for each sample type. The EMP is updated following a field event or during each year's review of Site operations and environmental data as part of the Annual Report.

5.3 Leachate Indicator Parameters

The leachate indicator parameters selected for the Site were based on parameters that are typically elevated in construction and demolition landfill leachate as well as IL+ soils:

– Alkalinity (total)	– Hydrogen Sulphide
– Ammonia	– Iron
– Boron	– Manganese
– Chloride	– Oxidation Reduction Potential (ORP)
– Conductivity (lab)	– Sulphate
– Hardness	– Total Dissolved Solids (TDS) (lab)

Parameter	Description
Hardness	Caused by the increased concentrations of calcium and magnesium ions due to the waste materials and more acidic pH breaking down the native lime-rich soils.
TDS	A measure of the quantity of dissolved ions in solution. TDS increases with the dissolution of waste materials and salts.
Conductivity	Electrical or specific conductivity increases in leachate-affected groundwater due to the increased conductive capacity of water as a result of increased dissolved ions.
Chloride	Chloride is generally abundant in municipal solid waste, however, is often found at lower concentrations in construction and demolition waste (Townsend, 2000). Chloride is formed in part by the degradation of various wastes and can be a very useful leachate indicator parameter because it is not subject to retardation processes and is therefore a conservative tracer.
Alkalinity	Alkalinity typically increases down-gradient of landfills primarily due to elevated levels of dissolved carbon dioxide in affected water (produced by the biological breakdown of organic material) causing the dissolution of carbonate from natural geologic materials within the aquifer.
Hydrogen Sulphide	Under anaerobic conditions, sulphide (as H ₂ S) is observed through the reduction of sulphur species. The reducing conditions resulting from the presence of buried waste favor the development of sulphide in leachate.
Sulphate	Construction and demolition waste landfills often generate elevated concentrations of sulphate in leachate due to the abundance of sulphate available from gypsum in drywall and other building materials in the waste stream.
Ammonia	High concentrations of ammonia are observed when the landfill enters its anaerobic stage. In the anaerobic stage, anaerobic decomposition dominates, resulting in more ammonia than nitrate or nitrite.
Boron	Boron is a useful leachate indicator parameter as it is not subject to retardation processes and is therefore a conservative tracer.
Iron and Manganese	Concentrations typically increase in landfill-affected groundwater due to the alteration of redox conditions within the groundwater. The breakdown of dissolved organic matter within leachate consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms.
Petroleum Hydrocarbons (including PAHs)	Waste in the form of creosote timbers and IL+ soil can contain petroleum hydrocarbons including polycyclic aromatic hydrocarbons (PAHs), which is a useful indicator parameter since petroleum hydrocarbons are not naturally present in groundwater on-site.

5.4 Applicable Water Quality Standards

The downgradient groundwater analytical results have been assessed to the BC CSR DW standards as specified in Section 3.5 of the OC.

The CSR DW standards are appropriate for evaluating water quality at permitted landfills as stated in the BC MOE Landfill Criteria for Municipal Solid Waste (Second Edition, June 2016) and based on the following rationale.

Rationale

Protocol 21 states that both current and future drinking water use must be considered when determining whether CSR DW standards apply to a site. Future land use in the vicinity of the Site may include potable water supply, therefore the drinking water exposure pathway is applicable for the Site and DW standards apply.

Protocol 21 also states that CSR freshwater aquatic life (FWAL) standards apply to sites located within 500 m of an aquatic receiving environment (i.e., a surface water body containing aquatic life) unless it can be demonstrated that the groundwater discharges into a different surface water body (located greater than 500 m from the site) or that groundwater does not migrate to within 500 m of a surface water body that contains aquatic life. The results of the aquatic life assessment completed down-gradient of the Site as part of the HHCR revealed that no surface water bodies are present within 500 m east of the Site. The assessment identified two watercourses within 500 m of the southeast Site boundary; however, the watercourses are located cross-gradient of the Original Landfill and at an

elevation well above (at least 24 m) groundwater leaving the Site. In addition, Rico Lake and McIvor Lake are located upgradient based on Site flow patterns (Figures 5 and 6) and are therefore also not considered aquatic receiving environments. Based on these results, the CSR AW standards do not apply to groundwater quality at the Site.

Per CSR Schedule 3.2 footnotes, iron and manganese standards only apply to select CSR Schedule 2 activities including specific waste disposal and recycling operations activities (biomedical waste disposal, organic or petroleum material landspreading [landfarming], on-site industrial woodwaste disposal at specific industry sites and municipal or provincial road snow removal dumping). The Site's activities do not trigger the applicability of these standards.

5.5 Sampling Methodology

Sampling was conducted in accordance with the BC Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air Emission, Water, Wastewater, Soil, Sediment and Biological Samples (British Columbia, Ministry of Environment, 2013) (BC Field Sampling Manual) and GHD's standard operating procedures.

5.6 Laboratory Program

Analytical services were provided by Bureau Veritas Laboratories (BV) of Burnaby, BC. BV is an accredited by the Canadian Association for Laboratory Accreditation (CALA) to perform the analytical tests required as part of the EMP. Laboratory reports and respective field sample keys (FSK) for each monitoring event are provided in Appendix C.

5.7 Data Quality Assessment and Validation

A qualified GHD chemist completed data validation to assess laboratory and field QA/QC measures. The QA/QC results presented in the annual memorandum (Appendix D) indicate that data exhibited acceptable levels of accuracy and precision with the qualifications noted. All data collected for the 2022 EMP has been determined to be acceptable for use in this Annual Report.

6. Water Level Monitoring Results

Water levels were measured from the monitoring wells on-Site in April, June, September, and November. The June and November events included water levels from all wells in the monitoring network. Water level monitoring data is presented in the attached Table 1. Groundwater contours for June and November are presented on Figures 5 and 6.

The inferred groundwater flow direction within the sand and gravel aquifer is directed from the northwest towards the southeast (i.e., from McIvor Lake towards the southeast corner of the Site). McIvor Lake is the headwaters for the sand and gravel aquifer underlying the Site. This groundwater flow direction occurred during each quarterly monitoring event and is consistent with historical results.

7. Original Landfill EMP Results and Water Quality Assessment

This section presents the Original Landfill EMP results and an assessment of groundwater and leak detection layer water quality for evidence of landfill-derived alterations. Water quality was assessed through an evaluation of the spatial distribution and temporal trends of typical leachate indicator parameters in downgradient groundwater as compared to leachate and background quality as well as baseline results. Baseline results were established prior to landfilling as part of the HHCR. Concentration versus time plots for leachate indicator parameters are presented in Appendix E.

7.1 Leachate Quality

Characterization of leachate generated within the Original Lined Cell was completed via sample collection from the leachate access pipe S05-19 on June 23, 2022. The leachate access pipe was dry in November.

Leachate is also scheduled for sample collection at leachate sump S03-19; however, this sump was inaccessible due to the location of super-sacs that were placed around the sump in June and November.

The June leachate sample was analyzed for general chemistry, nutrients, sulphides, total metals, polycyclic aromatic hydrocarbons (PAHs), and extractable petroleum hydrocarbons (EPHs/LEPH/HEPH). Benzene, toluene, ethylbenzene, and xylene (BTEX), and volatile petroleum hydrocarbons (VPH) are also scheduled for analysis; however, were not completed in June due to an inadvertent field error when filling out the chain of custody. The analytical leachate results are provided in Table 2.

A summary of the indicator parameters concentrations from leachate, leak detection (Section 7.2), and groundwater samples (Section 7.3) are presented in Table 7.1 below.

Based on the leachate analytical results, leachate can continue to be characterized as:

- Weak leachate containing low concentrations of Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), ammonia, and nitrogen (i.e., nitrate, nitrite) as well as high concentrations of calcium and magnesium due to the nature of the C&D waste.
- Containing metals in concentrations higher than the surrounding groundwater likely derived from the acceptance of soil that meets the applicable soil discharge standards for the Site. Moderate reducing conditions are also present within the landfill (ORP is -69 mV) causing iron and manganese to precipitate out of soil and into the leachate, further increasing their concentration in leachate.
- Containing PAH concentrations greater than standards, likely derived from the presence of the creosote treated wood waste within the lined cell and soil that meets the applicable soil discharge standards for the Site.

Table 7.1 Leachate Water Quality Summary of Indicator Parameters – Original Landfill (April-November)

Leachate Indicator Parameter	Upgradient Concentration Range	Cross-Gradient Concentration Range	Downgradient Concentration Range	Leak Detection System Range	Leachate Concentration
ORP (millivolts)	(-146) - 305	132 - 324	176 – 352	(-68) – (-8)	-69
TDS (lab)	40 - 120	76 - 940	110 - 3000	270 - 960	870
Dissolved Hardness	28.2 - 65.2	54.6 - 638	66.8 - 273	430 - 610	628
Conductivity (lab) (uS/cm)	66 - 160	130 - 1200	160 - 570	530 – 1500	1500
Bicarbonate	34 - 73	28 - 120	78 - 350	220 - 460	720
Alkalinity (total)	28 - 60	23 - 100	64 - 290	180 - 370	590
Chloride	ND (1.0) – 6.5	3.6 - 69	1.6 – 7.7	25 - 79	120
Dissolved Sulphur	ND (3.0) – 3.6	ND (3.0) - 151	ND (3.0) – 4.5	106	--
Sulphate	ND (3.6) – 8.3	4.2 - 420	5.5 - 12	51 - 280	4.6
Hydrogen Sulphide	ND (0.005) – 0.0058	ND (0.005)	ND (0.005) – 0.034	ND (0.005) - 0.20	0.12
Boron	ND (0.05)	ND (0.05)	ND (0.05)	0.307/ 0.087 – 0.221	-- / 0.610
Iron	ND (0.005)	ND (0.005) - 0.064	0.0438 – 0.0064	36.4/ 6.92 – 35.1	-- / 16.3
Manganese	ND (0.001)	ND (0.001)	ND (0.001) - 0.0077	10.1/ 3.6 – 9.54	/ 6.3

Leachate Indicator Parameter	Upgradient Concentration Range	Cross-Gradient Concentration Range	Downgradient Concentration Range	Leak Detection System Range	Leachate Concentration
Total PAHs	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.0013	--
Benzo(a)anthracene	ND (0.00001)	ND (0.00001)	ND (0.00001)	ND (0.00001)	0.00051
Benzo(a)pyrene	ND (0.000005)	ND (0.000005)	ND (0.000005)	ND (0.000005)	0.00018
Naphthalene	ND (0.0001)	ND (0.0001)	ND (0.0001)	0.00065	1.4
Notes: Units are in mg/L unless otherwise noted; Red - greater than CSR DW standards; -- data not available; metal concentrations are dissolved unless a forward slash is present which denotes dissolved then total.					

7.2 Leak Detection System Water Quality

The leak detection system was sampled via the leak detection pipe (S01-17) to assess water quality in the leak detection system and the potential for leachate leakage through the upper liner of the lined cell. It is important to note that a secondary liner is present beneath the leak detection layer.

Leak detection water samples were analyzed for general chemistry, nutrients, total and dissolved metals, EPH/LEPH/HEPH, PAHs, and VOCs. The 2022 analytical results are presented in the attached Table 3.

A summary of the indicator parameter concentrations reported in the water sampled from the leak detection system for the Original Landfill are presented in Table 7.1.

General Chemistry Parameters, Nutrients and Metals

The general chemistry, nutrients, and metals leachate indicator parameters are present in the leak detection system (S01-17) at higher concentrations than the surrounding groundwater. These parameters are comparable in concentration to leachate (S05-19). Sulphate, sulfides, iron, and manganese are greater in concentrations compared to leachate.

PAHs and VPH

PAH and VPH compounds in the leak detection system samples were either not detected or reported at concentrations below the BC CSR DW standards.

VOCs

VOCs were not detected in the leak detection system.

7.3 Groundwater Quality

Water quality results have been assessed for evidence of leachate derived alterations sourced from the Original Landfill.

Groundwater samples were analyzed for general chemistry parameters, nutrients, and dissolved metals. Downgradient groundwater samples were also analyzed for PAHs and VOCs. The 2022 analytical results are presented in Table 4. A summary of the leachate indicator parameter concentrations reported in the upgradient wells (MW2-14, MW2A-16, MW3-14), cross-gradient well (MW10-17), and down-gradient well (MW11-19) are presented in Table 7.1.

Upgradient Groundwater Monitoring Wells

Water quality at the upgradient monitoring wells (MW2-14, MW2A-16, and MW3-14) can be characterized as relatively fresh water with low concentrations of general chemistry, hardness (soft), nutrients, and metals. No petroleum hydrocarbons are present in upgradient groundwater.

Groundwater quality at the upgradient monitoring wells in 2022 is within historical concentration ranges. No exceedances of the CSR DW standards occurred in the upgradient wells in 2022.

Cross-gradient Groundwater Monitoring Well

The water quality at cross-gradient well MW10-17 indicates alteration potentially from site activities. Chloride, conductivity, sulphate, and hardness concentrations increased in 2022 with the highest concentrations observed in November. Concentrations are below the CSR DW standards (i.e., no exceedances occurred in 2022). Based on the concentration versus time plots, seasonal variation is not apparent. In response to the groundwater impacts at MW10-17, potential sources of alteration are being investigated.

Downgradient Groundwater Monitoring Well

The water quality at the downgradient well (MW11-19) is characterized by moderate concentrations of alkalinity, hardness (moderately hard), and metals relative to upgradient groundwater. No major water quality trends are apparent. EPH₁₉₋₃₂ and HEPH were present in groundwater in April (220 and 220 ug/L) and June (230 and 230 ug/L) at concentrations slightly above the laboratory detection limit (200 ug/L). No groundwater exceedances of the CSR DW standards occurred at the downgradient well in 2022.

8. New Landfill EMP Results and Water Quality Assessment

This section presents the New Landfill EMP results and an assessment of leachate, groundwater, leak detection layer water, and surface water quality. Groundwater and surface water quality were assessed through an evaluation of the spatial distribution and temporal trends of typical leachate indicator parameters compared to leachate and background quality as well as baseline results. Baseline results were established prior to landfilling as part of the HHCR. Groundwater concentration versus time plots for leachate indicator parameters are presented in Appendix E.

8.1 Leachate Quality

Characterization of leachate generated within the New Landfill was completed via sample collection from leachate sump S06-21. Samples were collected in April, June, September, and November. Treated leachate is sampled from the Treated Leachate Infiltration Pond (TLIP) if discharging to assess treatment performance and determine if changes to the treatment process are required. Discharge did not occur during the EEMP events. Leachate samples were analyzed for general chemistry, nutrients, sulphide, total metals, dissolved hardness, PAHs, LEPH, HEPH, EPH, and VPH. The analytical leachate results are provided in Table 2.

A summary of the indicator parameters concentrations from leachate, leak detection (Section 8.2), and groundwater samples (Section 8.3) is presented in Table 8.1 below.

Based on the leachate analytical results, leachate can be characterized as:

- Characteristic of C&D waste and IL+ soil, containing:
 - High concentrations of select metals, bicarbonate, sulphate, total dissolved solids, and conductivity
 - Low concentrations of BOD, COD, and ammonia and no detections of nitrate and nitrite
- Variable oxidation reduction potential ranging from slight to moderately high (-31 to -333 mV)
- Containing light extractable petroleum hydrocarbons (i.e., EPH_{C10-C19} and LEPH)
- Containing low PAH concentrations with benzo(a)pyrene concentrations that are slightly above the CSR DW Standard.

Table 8.1 Leachate Water Quality Summary of Indicator Parameters – New Landfill (April-November)

Leachate Indicator Parameter	Upgradient Concentration Range	Cross-Gradient Concentration Range	Downgradient Concentration Range	Leak Detection System Range	Leachate Concentration Range
ORP (millivolts)	0 – 373	157 – 305	(-146) – 352	(-85) - 197	(-333) – (-31)
TDS (lab)	34 – 410	40 – 120	56 – 3000	360 - 3800	3500 – 4900
Dissolved Hardness	27.6 – 180	28.2 – 65.2	35.3 – 638	78.8 – 85.3	1660 – 2220
Conductivity (lab) (uS/cm)	61 - 520	66 – 160	92 – 1200	3800 - 4000	4000 – 4600
Bicarbonate	33 – 120	34 – 73	28 – 350	1300 - 1600	870 – 1900
Alkalinity (total)	27 – 95	28 – 60	23 – 290	1200 - 1500	710 – 1500
Chloride	ND (1.0) - 94	ND (1.0) – 6.5	1.6 – 69	28 - 37	190 – 240
Sulphur	ND (3.0) – 7.2	ND (3.0)	ND (3.0) - 151	--	264 – 414
Sulphate	2.2 – 20	2.6 – 8.1	ND (4.2) – 420	730 - 840	800 - 1300
Hydrogen Sulphide	ND (0.005) – 0.027	ND (0.005) – 0.0058	ND (0.005) – 0.034	0.012 - 0.024	4.4 - 13
Boron	ND (0.05)	ND (0.05)	ND (0.05)	0.652 – 1.28	13.8 – 17.6
Iron	ND (0.005) – 0.124	ND (0.005)	ND (0.005) – 0.0438	1.2 – 14.8	1.6 – 22.6
Manganese	ND (0.001) – 0.202	ND (0.001)	ND (0.001) – 0.0615	0.289 – 0.702	4.95 – 8.83
Total PAHs	ND (0.1)	ND (0.1)	ND (0.1)	--	--
Notes: Units are in mg/L unless otherwise noted; Red - greater than CSR DW standards; -- data not available. Boron, iron, and manganese are dissolved for groundwater and total for the leak detection system and leachate.					

8.2 Landfill Leak Detection System Water Quality

The leak detection system was monitored quarterly from the sump (LDS). During the June and September events, water was present in the leak detection system. During the April and November events, water was not present in the leak detection system. Samples were collected to assess the water quality and potential for leachate leakage through the primary liner of Cell 1 East. Leak detection samples were analyzed for general chemistry, nutrients, total metals, dissolved hardness, EPH, LEPH, HEPH, and PAHs. The 2022 analytical results are presented in the attached Table 3.

A summary of the indicator parameter concentrations reported in the water sampled from the leak detection system at the New Landfill are presented in Table 8.2 above.

As shown in Table 8.1, the leak detection system water is of similar quality to the leachate. Leachate from the Cell 1 East remains higher in strength based on concentrations of dissolved hardness, chloride, hydrogen sulphide, metals, and PAHs.

The leak detection system water quality results were communicated to Upland which triggered two investigations. In August and September, Northwin pumped the leak detection system dry, discharging the leachate to the new leachate treatment system. Once dry, Northwin excavated the waste to visually assess the condition of the primary liner. Damage to the HDPE liner and GCL was found (i.e., primary liner). The underlying drainage geo-composite was not damaged (i.e., secondary base liner). Repairs were completed by Joe Cassidy of Cassidy Liner Consulting. Repair inspections were completed by David Barbour of GHD. The leak detection was dry in November following the liner repairs indicating that the repair resolved the leak.

8.3 Groundwater Quality

Water quality results have been assessed for evidence of leachate derived alterations. Upgradient and cross-gradient groundwater samples were analyzed for general chemistry parameters, nutrients, and dissolved metals. Downgradient groundwater samples were analyzed for general chemistry, nutrients, dissolved metals, EPH, LEPH, HEPH, and PAHs. The 2022 analytical results are presented in Table 4.

A summary of the leachate indicator parameter concentrations reported in the upgradient wells, cross-gradient wells, and downgradient wells are summarized in Table 8.1 above.

Upgradient Groundwater Monitoring Wells

Water quality at the upgradient monitoring wells (MW6-17, MW9-17, MW1-14, MW4A-15, and MW4B-15) is similar in quality to the cross-gradient wells and is characterized as relatively fresh water with low concentrations of general chemistry, hardness (soft), nutrients, and metals. Groundwater from MW9 is slightly different in quality based on lower (approximately an order of magnitude) concentrations of the major ions and cations. No petroleum hydrocarbons are present in upgradient groundwater.

The 2022 dataset was compared to historical concentrations. Little variation was observed between the 2017 to 2022 monitoring events at the upgradient groundwater monitoring wells, and concentrations of leachate indicator parameters do not appear to be increasing over time.

No exceedances of the CSR DW standards occurred in the 2022 monitoring events.

Cross-gradient Groundwater Monitoring Wells

Water quality at the cross-gradient monitoring wells (MW2-14 and MW2A-16) can be characterized as relatively fresh water with low concentrations of general chemistry, hardness (soft), nutrients, and metals. No petroleum hydrocarbons are present in cross-gradient groundwater.

Groundwater quality at the cross-gradient monitoring wells in 2022 is within historical concentration ranges and leachate indicator parameters are not increasing. No exceedances of the CSR DW standards occurred in 2022.

Downgradient Groundwater Monitoring Wells

The water quality at the downgradient wells (MW12-22, MW11-19, and MW3-14) is characterized as unimpacted water with low concentrations of alkalinity, hardness (moderately hard), chloride, nutrients, and dissolved metals. Seasonal variation in analyte concentrations are present. No exceedances of the CSR DW standards occurred in the 2022 monitoring events.

The water quality at downgradient well MW10-17 indicates alteration potentially from site activities. Chloride, conductivity, sulphate, and hardness concentrations increased in 2022 with the highest concentrations observed in November. Concentrations are below the CSR DW standards (i.e., no exceedances occurred in 2022). Based on the concentration versus time plots, seasonal variation is not apparent. In response to the groundwater impacts at MW10-17, potential sources of alteration are being investigated.

8.4 Stormwater

The perimeter stormwater ditches will be established and included in the EMP once final cover is placed. While the landfill is active, landfill operational berms separate clean stormwater and contact water. Contact water remains within the lined cell and separate from the clean stormwater runoff. Clean stormwater continues to be directed away from the landfill for infiltration into the groundwater aquifer below the Site. The east and west surface water ditches will be removed from the specification.

8.5 Surface Water

Surface water quality is monitored at Mclvor Lake and Rico Lake annually in November. Additional samples were collected in April and June 2022 due to field error. Samples were analyzed for general chemistry parameters, nutrients, total metals, and dissolved hardness. The 2022 analytical results are presented in Table 5.

A summary of the leachate indicator parameter concentrations reported in Mclvor and Rico Lake are summarized in Table 8.2.

Table 8.2 Surface Water Quality Summary of Indicator Parameters – New Landfill (April-November)

Leachate Indicator Parameter	Upgradient GW Concentration Range	Surface Water Concentration Range	Leak Detection System Range	Leachate Concentration Range
ORP (millivolts)	0 – 373	-54 – 294	(-85) - 197	(-333) – (-31)
TDS (lab)	34 – 410	28 – 52	360 - 3800	1800 – 4900
Dissolved Hardness	27.6 – 180	14.7 – 23.1	78.8 – 85.3	950 – 2220
Conductivity (lab) (uS/cm)	61 - 520	47 – 57	3800 - 4000	2300 – 4600
Bicarbonate	33 – 120	18 – 28	1300 - 1600	310 – 1900
Alkalinity (total)	27 – 95	14 – 23	1200 - 1500	250 – 1500
Chloride	ND (1.0) - 94	ND (1.0) – 6.1	28 - 37	120 – 240
Sulphur	ND (3.0) – 7.2	ND (3.0) – ND (3.0)	--	--
Sulphate	2.2 – 20	ND (1.0) – 3.7	730 - 840	800 - 1300
Hydrogen Sulphide	ND (0.005) – 0.027	ND (0.005) – ND (0.005)	0.012 - 0.024	1.3 - 13
Boron	ND (0.05)	ND (0.05)	0.652 – 1.28	7.3 – 17.6
Iron	ND (0.005) – 0.124	0.16 – 0.427	1.2 – 14.8	1.6 – 22.6
Manganese	ND (0.001) – 0.202	0.812 – 1.16	0.289 – 0.702	2.81 – 8.83

Surface water quality in Mclvor and Rico Lakes is similar to that observed in the sand and gravel aquifer and is characterized as being low in alkalinity, hardness, conductivity, and TDS and with low concentrations of nutrients and major ions.

Mclvor and Rico Lakes are not interpreted to be receptors of groundwater flow under the area of the New Landfill based on the documented flow direction (Figure 5 and 6). However, as Rico Lake discharges into Mclvor Lake and Mclvor Lake recharges the sand and gravel aquifer, analytical results from Mclvor and Rico Lakes are useful in characterizing water quality upgradient of the Site.

Seasonal variation was evident in water quality at Rico Lake as concentrations of most parameters appear elevated during the November monitoring event which is consistent with historical results. Historically, concentrations are higher in Q4 comparatively. Minimal seasonal variation in water quality between the monitoring events was evident at Mclvor Lake, which is also consistent with historical results.

8.6 Landfill Gas in Soil Quality

Monitoring of landfill gas in soil began following the installation of LFG1-22 and LFG2-22 on July 27, 2022. In November, methane was detected in soil at 1.6% v/v at LFG1-22 and 0.2% v/v at LFG2-22. These concentrations do not exceed the lower explosive limit of methane (5% v/v), which is compliance criteria per the Landfill Criteria. The landfill gas results are presented in Table 6.

9. Conclusions

Based on the results of this Annual Report, the operational and water quality conclusions presented below can be made. The annual status form is provided in Appendix F.

Operational Conclusions

Original Landfill

- The Original Landfill was compliant with the operational conditions of the OC during the Reporting Period, and no complaints were received. The annual status form is provided as Appendix F.
- The Original Landfill stopped receiving waste on November 24, 2021. The Original Landfill was tarped until decommissioning activities began in November 2022. The decommissioning activities will be completed by April 2023.
- Two batches of leachate were pumped from the Original Landfill and discharged to the New Landfill leachate management works for treatment.

New Landfill

- The New Landfill was compliant with the operational conditions of the OC in 2022, and no complaints were received. The annual status form is provided as Appendix F.
- The construction of Cell 1 West began and waste. No other significant works occurred in 2022.
- An estimated total of 8,752 m³ of C&D waste, 24,045 m³ of non-hazardous waste quality soil, 1,486 m³, and 173 m³ of creosote timbers were discharged to the New Landfill.
- The recyclable material received included 5,235 tonnes of clean concrete, 537 tonnes of concrete with rebar, 4,229 tonnes of asphalt, and 1,327 tonnes of rubble.
- The total airspace consumption from January 1 to December 31, 2022 was approximately 34,472 m³. The remaining volume of Cell 1 East is 71,934 m³. The remaining volume for the New Landfill is 497,893 m³.
- In 2022, the quantity of leachate collected, treated, and discharged from the New Landfill was approximately 1,984 m³ of leachate from the New Landfill.
- Water in the leak detection system triggered an investigation of the integrity of the New Landfill primary liner. In April and September, primary liner deficiencies were found. Repairs were completed by Joe Cassidy of Cassidy Liner Consulting. Repair inspections were completed by David Barbour of GHD. The leak detection system was dry in November indicating that the repair resolved the leak.

Water Quality Conclusions

Original Landfill

- Downgradient groundwater concentrations were less than the applicable CSR DW standards (i.e., well below 20% of the standard).
- Water level monitoring results show that groundwater flow direction was in a general southeasterly direction. Groundwater quality at the upgradient and cross-gradient monitoring wells is consistent with previous water quality monitoring results with the exception of MW10-17. The water quality at MW10-17 indicates alteration potentially from site activities. Chloride, conductivity, sulphate, and hardness concentrations increased in 2022 with the highest concentrations observed in November. Concentrations are below the CSR DW standards (i.e., no exceedances occurred in 2022). Based on the concentration versus time plots, seasonal variation is not apparent. In response to the groundwater impacts at MW10-17, potential sources of the alteration are being investigated.
- Within the leak detection system, general chemistry, nutrients, and metals leachate indicator parameters are comparable in concentration to leachate (S05-19). Sulphate, sulfides, iron, and manganese are greater in concentrations compared to leachate. PAH and VPH compounds are either not detected or reported at concentrations below the BC CSR DW standards. VOCs are not present in the leak detection samples.

New Landfill

- Downgradient groundwater concentrations were well below the applicable CSR DW standards (i.e., below 20% of the standard) with the exception of MW10-11. In November, chloride was 420 mg/L which is approaching the CSR standard of 500 mg/L (within 16% of the standard).
- The water quality at downgradient well MW10-17 indicates alteration potentially from site activities. Chloride, conductivity, sulphate, and hardness concentrations increased in 2022 with the highest concentrations observed in November. Concentrations are below the CSR DW standards (i.e., no exceedances occurred in 2022). Based on the concentration versus time plots, seasonal variation is not apparent. In response to the groundwater impacts at MW10-17, potential sources of the alteration are being investigated.
- Water level monitoring results show that groundwater flow direction was in a general southeasterly direction.
- Groundwater quality at the upgradient and cross-gradient monitoring wells is consistent with previous water quality monitoring results.
- The leak detection system water sampled in April and September is of similar quality to the leachate. However, leachate remains higher in strength based on concentrations of dissolved hardness, chloride, hydrogen sulphide, metals, and PAHs. The leak detection system was dry during the November monitoring event indicating that the liner repair activities resolved the leak.

10. Recommendations

Based on the conclusions presented in this Annual Report, the following operational and water quality recommendations can be made:

Original Landfill Operational Recommendations

- Complete the Original Landfill decommissioning activities by April 2023 and the associated reporting per the OC.

New Landfill Operational Recommendations

- Complete the significant works scheduled for 2023 as presented in Section 3.4.

Original Landfill Water Quality Monitoring Recommendations

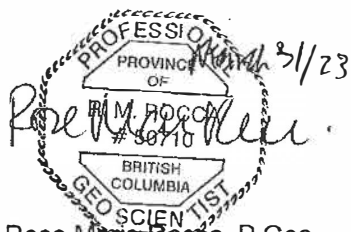
- The EMP for the Original Landfill will no longer be required in 2022 since decommissioning activities will be completed in April 2022 before the first monitoring event which is typically completed in June.

New Landfill Water Quality Recommendations

- Install downgradient well MW13 in 2023
- Complete the New Landfill environmental monitoring plan as outlined in Appendix G. Updates include:
 - The addition of Cell 1 West Sump (S07) to the quarterly leachate monitoring program following waste discharge.
 - Removal of the east and west ditches. These locations will be constructed and monitored following the placement of final cover.
- Recover MW4A-15 and MW4B-15 which were buried following the Q3 monitoring event in 2022.
- Investigate the source of groundwater alteration at MW10-17.

All of Which is Respectfully Submitted,

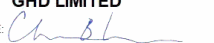
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RR EGBC ID #: 45835
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Tables

Table 1

Hydraulic Monitoring Results
2022 Operations and Monitoring Report
Upland Original and New Landfills
Campbell River, British Columbia

Monitoring Location	Depth to Bottom (m BGS)	Reference Elevation TOR (m AMSL)	Depth to Water (m BTOR)				Water Elevation (m AMSL)				Screened Unit (Aquifer)
	Date		April 1, 2022	June 22, 2022	September 9, 2022	November 16, 2022	April 1, 2022	June 22, 2022	September 9, 2022	November 16, 2022	Primary Constituent
MW1-14	11.0	172.9	9.7	10.7	8.1	11.0	163.2	162.3	164.9	161.9	Sand/gravel (S&G Aquifer)
MW2-14	21.6	173.8	17.4	18.7	17.2	18.4	156.4	155.2	156.7	155.4	Sand/gravel (S&G Aquifer)
MW2A-16	45.4	173.9	17.4	18.6	17.1	18.4	156.5	155.3	156.8	155.5	Sand (S&G Aquifer)
MW3-14	18.6	168.6	-	15.3	-	15.4	-	153.3	-	153.2	Sand/gravel (S&G Aquifer)
MW4A-15	21.3	169.3	7.0	8.2	6.6	_ ⁵	162.3	161.1	162.7	_ ⁵	Bedrock (S&G Aquifer)
MW4B-15	18.3	169.3	7.2	8.4	6.8	_ ⁵	162.1	160.9	162.5	_ ⁵	Sand (S&G Aquifer)
MW5A-15	10.7	191.9	-	6.9	-	8.7	-	185.0	-	183.2	Bedrock (Shallow Aquifer)
MW5B-15	8.2	192.0	-	8.1	-	7.3	-	183.9	-	184.7	Sand/Silt with clay (Shallow Aquifer)
MW6-17	11.3	185.4	7.6	8.1	9.0	9.3	177.8	177.3	176.4	176.1	Sand (S&G Aquifer)
MW7-17	4.3	187.5	-	3.3	-	3.6	-	184.2	-	183.9	Gravel (Shallow Aquifer)
MW8-17	18.8	192.5	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Gravel (S&G Aquifer)
MW9-17	33.5	191.7	26.4	23.6	24.5	26.9	165.3	168.0	167.2	164.7	Sand/gravel (S&G Aquifer)
MW10-17	46.3	189.1	40.6	41.5	41.4	41.6	148.5	147.6	147.7	147.5	Sand (S&G Aquifer)
MW15A-18	15.2	183.1	-	5.5	-	8.0	-	177.5	-	175.1	Bedrock (S&G Aquifer)
MW15B-18	9.0	183.2	-	5.7	-	_ ⁴	-	177.5	-	_ ⁴	Silty/Clayey Sand (S&G Aquifer)
MW11-19	54.9	194.8	48.4	47.1	47.4	47.6	146.4	147.7	147.4	147.2	Sand (S&G Aquifer)
MW12-22 ⁶	45.1	-	-	-	40.2	40.5	-	-	-	-	Sand (S&G Aquifer)
PZ1-19	20.4	192.1	-	19.7	-	_ ⁵	-	172.4	-	_ ⁵	Sand/Silty Gravel (Shallow Aquifer)
Mclvor Lake*	-	-	-	-	-	-	177.0	176.7 ²	177.3	176.3 ²	N/A
SW15-02 [Rico Lake]**	-	180.3	1.3	_ ¹	_ ¹	_ ¹	179.1	<180.3 ¹	<180.3 ¹	<180.3 ¹	N/A
East Surface Water Ditch	-	-	-	-	-	-	Dry	Dry	Dry	Dry	N/A
West Surface Water Ditch	-	-	-	-	-	-	Dry	Dry	Dry	Dry	N/A
LDS	-	-	-	-	-	-	Dry	Not Dry	Not Dry	Dry	N/A
LDMP-1	-	-	-	-	-	-	-	-	Dry	Dry	N/A
LDMP-2	-	-	-	-	-	-	-	-	Dry	Dry	N/A
LDMP-3	-	-	-	-	-	-	-	-	Dry	Dry	N/A
LDMP-4	-	-	-	-	-	-	-	-	_ ³	_ ³	N/A

Notes:
191.88 Surveys completed by McElhanney on April 6, 2016 and March 16 and 31, 2017.
185.4 Survey completed by Upland Excavating Ltd. on January 29th, 2015, March 8, 2016 and April 6th, 2016. Elevations measured with respect to AMSL.
* Mclvor Lake elevations are based on BC Hydro record of water elevations at Ladore Dam recorded every three hours.
** Surface water gauge reference elevation refers to the bottom of the gauge (0 m on gauge = 180.33 m amsl).
m BGS metres below ground surface.
m AMSL metres above mean sea level (WGS1984).
TOR top of riser.
S&G sand and gravel.
N/A not applicable.
MW monitoring well.
LDS leak detection sump
LDMP leak detection monitoring pipe.
- Not included in the EMP event.
1 Water level below gauge.
2 Historical Sept and Nov averages recorded as part of the TAR and EMP were used ; water level not recorded from BC Hydro website for these months in 2022.
3 Obstruction at 0.9m BTOR.
4 Inaccessible due to the placement of quarry material in the area.
5 Buried during landfill construction activities.
6 MW12-22 will be surveyed in early 2023.

Table 2
Leachate Analytical Results
2022 Operations and Monitoring Report
Upland Original and New Landfills
Campbell River, British Columbia

Sample Location: Sample ID: Sample Date:			Original Landfill				New Landfill					
			S03-19		S05-19		S06-21					
			Inaccessible ¹ 06/23/2022	Inaccessible ¹ 11/17/2022	WL-11222680-230622-CXW-03 06/23/2022	Dry ² 11/17/2022	WL-11222680-010422-MJ-01 04/01/2022	WL-11222680-010422-MJ-02 04/01/2022	WL-11222680-230622-CXW-04 06/23/2022	WL-11222680-080922-CXW-02 09/08/2022	WL-11222680-080922-CXW-03 09/08/2022	Dry ² 11/17/2022
Parameters	Units	BC CSR ⁽¹⁾ DW a						Duplicate		Duplicate		
Field Parameters												
Conductivity, field	uS/cm	--	-	-	1.27	-	4530	4530	453	409	409	-
Dissolved oxygen (DO), field	mg/L	--	-	-	-	-	8.52	8.52	-	1.88	1.88	-
Oxidation reduction potential (ORP), field	millivolts	--	-	-	-69	-	-150	-150	-333	-31	-31	-
pH, field	s.u.	--	-	-	6.41	-	6.69	6.69	6.85	7.19	7.19	-
Temperature, field	Deg C	--	-	-	11.95	-	10.20	10.20	16.10	19.30	19.30	-
Temperature, field	Deg C	--	-	-	11.95	-	10.20	10.20	16.10	19.30	19.30	-
Total dissolved solids, field (TDS)	mg/L	--	-	-	0.811	-	2900	2900	290	-	-	-
Turbidity, field	NTU	--	-	-	42.7	-	275	275	58.2	101	101	-
General Chemistry												
Alkalinity (as CaCO3 pH=8.3)	mg/L	--	-	-	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (5.0)	ND (1.0)	ND (1.0)	-
Alkalinity, total (as CaCO3)	mg/L	--	-	-	590	-	1400	1500	1500	710	710	-
Biochemical oxygen demand (BOD)	mg/L	--	-	-	19	-	550	580	130	21	20	-
Chemical oxygen demand (COD)	mg/L	--	-	-	175	-	1320	1310	611	297	302	-
Chloride (dissolved)	mg/L	250	-	-	120	-	190	190	230	240	240	-
Conductivity	uS/cm	--	-	-	1500	-	4600	4600	4000	4000	4000	-
Hardness	mg/L	--	-	-	-	-	2370	2310	-	-	-	-
Hardness (dissolved)	mg/L	--	-	-	628	-	2130	2220	1820	1660	1670	-
Hydroxide (as CaCO3)	mg/L	--	-	-	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (5.0)	ND (1.0)	ND (1.0)	-
Sulphate (Dissolved)	mg/L	500	-	-	4.6	-	1200 ^a	1200 ^a	800 ^a	1300 ^a	1300 ^a	-
Un-ionized Sulphide as H2S	mg/L	0.05	-	-	0.12 J ^a	-	7.9 J ^a	11 J ^a	13 J ^a	4.4 J ^a	4.5 J ^a	-
Total Sulfide as H2S	mg/L	--	-	-	0.14 J-	-	11 J	15 J	22 J-	12 J-	12 J-	-
Total Sulfide as H2S (calculated)	mg/L	--	-	-	0.11 J-	-	7.4 J	10 J	12 J-	4.1 J-	4.3 J-	-
Total Sulfide as S	mg/L	--	-	-	0.14 J-	-	10 J	14 J	21 J-	11 J-	12 J-	-
Total dissolved solids (TDS)	mg/L	--	-	-	870	-	4100	4900	3900	3500	3500	-
Total suspended solids (TSS)	mg/L	--	-	-	63	-	110	100	16	9.0	11	-
Nutrients												
Ammonia-N	mg/L	--	-	-	12	-	50	51	33	24	24	-
Bicarbonate (as CaCO3)	mg/L	--	-	-	720	-	1800	1800	1900	870	870	-
Carbonate (as CaCO3)	mg/L	--	-	-	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (5.0)	ND (1.0)	ND (1.0)	-
Nitrate (as N)	mg/L	10	-	-	0.647	-	ND (0.20)	ND (0.20)	ND (0.20)	0.376	0.351	-
Nitrite (as N)	mg/L	1	-	-	0.0296	-	0.055	0.057	ND (0.050)	0.131	0.150	-
Nitrite/Nitrate	mg/L	10	-	-	0.677	-	ND (0.20)	ND (0.20)	ND (0.20)	0.507	0.501	-
Orthophosphate	mg/L	--	-	-	0.016	-	0.021	0.021	0.80	0.067	0.065	-
Dissolved Metals												
Calcium (dissolved)	ug/L	--	-	-	185000	-	774000 J	814000 J	643000	532000	537000	-
Magnesium (dissolved)	ug/L	--	-	-	40000	-	47000 J	46500 J	52600	80900	80500	-
Total Metals												
Aluminum	ug/L	9500	-	-	758	-	1050	882	159	280	320	-
Antimony	ug/L	6	-	-	ND (0.50)	-	ND (5.0)	5.8	ND (2.5)	ND (5.0)	ND (5.0)	-
Arsenic	ug/L	10	-	-	5.22	-	31.9 ^a	33.4 ^a	21.5 ^a	5.1	4.8	-
Barium	ug/L	1000	-	-	62.1	-	253	250	140	161	151	-
Beryllium	ug/L	8	-	-	ND (0.10)	-	ND (1.0)	ND (1.0)	ND (0.50)	ND (1.0)	ND (1.0)	-
Bismuth	ug/L	--	-	-	ND (1.0)	-	ND (10)	ND (10)	ND (5.0)	ND (10)	ND (10)	-
Boron	ug/L	5000	-	-	610	-	13800 ^a	13800 ^a	10200 ^a	17600 ^a	16800 ^a	-
Cadmium	ug/L	5	-	-	0.049	-	0.99	1.02	0.184	ND (0.10)	ND (0.10)	-
Calcium	ug/L	--	-	-	162000	-	866000	844000	643000	483000	463000	-
Chromium	ug/L	50	-	-	4.6	-	19	18	14.0	13	12	-
Cobalt	ug/L	20 (i)	-	-	1.43	-	15.0	14.7	3.4	5.3	4.0	-
Copper	ug/L	1500	-	-	28.4	-	33.7	35.3	21.4	ND (5.0)	ND (5.0)	-
Iron	ug/L	6500	-	-	16300 ^a	-	22600 ^a	22100 ^a	2520	1600	1640	-
Lead	ug/L	10	-	-	0.58	-	8.6	8.4	1.3	ND (2.0)	ND (2.0)	-
Lithium	ug/L	8	-	-	ND (2.0)	-	ND (20) ^a	ND (20) ^a	ND (10) ^a	ND (20) ^a	ND (20) ^a	-
Magnesium	ug/L	--	-	-	35000	-	51000	48900	54300	85200	79900	-
Manganese	ug/L	1500	-	-	6300 ^a	-	7570 ^a	7340 ^a	4950 ^a	8830 ^a	8370 ^a	-
Mercury	ug/L	1	-	-	ND (0.019)	-	0.230	0.221	0.036	ND (0.019) J	ND (0.019) J	-
Molybdenum	ug/L	250	-	-	ND (1.0)	-	ND (10)	ND (10)	ND (5.0)	ND (10)	ND (10)	-
Nickel	ug/L	80	-	-	2.6	-	22	21	15.8	15	15	-
Phosphorus	ug/L	--	-	-	1380	-	1290	1250	1350	496	474	-
Potassium	ug/L	--	-	-	10300	-	58900	57900	57400	61000	58000	-
Selenium	ug/L	10	-	-	0.31	-	ND (1.0)	ND (1.0)	0.59	ND (1.0)	ND (1.0)	-
Silicon	ug/L	--	-	-	13800	-	21800	21100	21200	21200	20100	-
Silver	ug/L	20	-	-	ND (0.020)	-	ND (0.20)	ND (0.20)	ND (0.10)	ND (0.20)	ND (0.20)	-
Sodium	ug/L	200000	-	-	83600	-	246000 ^a	239000 ^a	252000 ^a	319000 ^a	305000 ^a	-
Strontium	ug/L	2500	-	-	780	-	3370 ^a	3240 ^a	3630 ^a	2840 ^a	2750 ^a	-
Sulphur	ug/L	--	-	-	ND (3000)	-	380000	378000	264000	414000	396000	-
Thallium	ug/L	--	-	-	ND (0.010)	-	ND (0.10)	ND (0.10)	ND (0.050)	ND (0.10)	ND (0.10)	-
Tin	ug/L	2500	-	-	ND (5.0)	-	ND (50)	ND (50)	ND (25)	ND (50)	ND (50)	-
Titanium	ug/L	--	-	-	28.3	-	143	147	43	ND (50)	ND (50)	-
Uranium	ug/L	20	-	-	0.12	-	ND (1.0)	ND (1.0)	0.95	ND (1.0)	ND (1.0)	-
Vanadium	ug/L	20	-	-	7.4	-	161 ^a	154 ^a	31 ^a	ND (50) ^a	ND (50) ^a	-
Zinc	ug/L	3000	-	-	39.2	-	2030	1990	424	ND (50)	ND (50)	-
Zirconium	ug/L	--	-	-	0.87	-	5.0	5.1	1.99	3.0	3.0	-

Table 2
Leachate Analytical Results
2022 Operations and Monitoring Report
Upland Original and New Landfills
Campbell River, British Columbia

Sample Location: Sample ID: Sample Date: Parameters	Units	BC CSR ⁽¹⁾ DW a	Original Landfill				New Landfill					
			S03-19		S05-19		S06-21					
			Inaccessible ¹ 06/23/2022	Inaccessible ¹ 11/17/2022	WL-11222680-230622-CXW-03 06/23/2022	Dry ² 11/17/2022	WL-11222680-010422-MJ-01 04/01/2022	WL-11222680-010422-MJ-02 04/01/2022 Duplicate	WL-11222680-230622-CXW-04 06/23/2022	WL-11222680-080922-CXW-02 09/08/2022	WL-11222680-080922-CXW-03 09/08/2022 Duplicate	Dry ² 11/17/2022
PHCs												
Extractable Petroleum Hydrocarbons (C10-C19)	ug/L	5000	-	-	4500	-	730	700	520	240	240	-
Extractable Petroleum Hydrocarbons (C19-C32)	ug/L	--	-	-	350	-	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	-
HEPH (C19-C32 less PAH)	ug/L	--	-	-	340	-	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	-
LEPH (C10-C19 less PAH)	ug/L	--	-	-	2700	-	730	700	510	240	240	-
Total Petroleum Hydrocarbons VPH (C6-C10)LessBTEX	ug/L	--	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons VH (C6-C10)	ug/L	15000	-	-	-	-	-	-	-	-	-	-
PAHs												
1-Methylnaphthalene	ug/L	5.5	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	ug/L	15	-	-	-	-	-	-	-	-	-	-
Acenaphthene	ug/L	250	-	-	140	-	0.39	0.38	0.79	0.25	0.25	-
Acenaphthylene	ug/L	--	-	-	-	-	-	-	-	-	-	-
Acridine	ug/L	--	-	-	2.9	-	0.21	0.21	0.21	0.068	0.069	-
Anthracene	ug/L	1000	-	-	8.2	-	0.022	0.021	0.056 J+	0.013	0.012	-
Benzo(a)anthracene	ug/L	0.07	-	-	0.51 ^a	-	0.046	0.041	0.046	ND (0.010)	ND (0.010)	-
Benzo(a)pyrene	ug/L	0.01	-	-	0.18 ^a	-	0.017 J ^a	0.0089 J	0.013 ^a	ND (0.0050)	ND (0.0050)	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	0.07	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	ug/L	0.05	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	ug/L	--	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	ug/L	--	-	-	-	-	-	-	-	-	-	-
Chrysene	ug/L	7	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	ug/L	0.01	-	-	-	-	-	-	-	-	-	-
Fluoranthene	ug/L	150	-	-	10	-	0.23	0.22	0.28	0.031	0.036	-
Fluorene	ug/L	150	-	-	71	-	0.15	0.15	0.42	0.13	0.13	-
Indeno(1,2,3-cd)pyrene	ug/L	--	-	-	-	-	-	-	-	-	-	-
Naphthalene	ug/L	80	-	-	1400 ^a	-	1.1	1.1	6.5	1.5	1.6	-
PAH high molecular weight	ug/L	--	-	-	-	-	-	-	-	-	-	-
PAH low molecular weight	ug/L	--	-	-	-	-	-	-	-	-	-	-
Phenanthrene	ug/L	--	-	-	83	-	0.14	0.13	0.42	0.11	0.11	-
Pyrene	ug/L	100	-	-	6.4	-	0.15	0.15	0.24	0.028	0.033	-
Total PAH	ug/L	--	-	-	-	-	-	-	-	-	-	-

Table 3
Leak Detection System Analytical Results
2022 Operations and Monitoring Report
Upland Original and New Landfills
Campbell River, British Columbia

Sample Location: Sample ID: Sample Date:	BC CSR ⁽¹⁾ DW a	Original Landfill			New Landfill			
		S01-17			LDS			
		WL-11222680-230622-CXW-01 06/23/2022 ^a	WL-11222680-230622-CXW-02 06/23/2022 ^a Duplicate	WL-11222680-171122-CXW-02 11/17/2022	Dry ^b 04/01/2022	WL-11222680-230622-CXW-05 06/23/2022 ^a	WL-11222680-080922-CXW-01 09/08/2022 ^a	Dry ^b 11/17/2022
Parameters	Units							
Field Parameters								
Conductivity, field	uS/cm	--	727	727	1820	-	352	411
Dissolved oxygen (DO), field	mg/L	--	-	-	9.51	-	-	3.78
Oxidation reduction potential (ORP), field	millivolts	--	-8	-8	-68	-	-85	197
pH, field	s.u.	--	6.88	6.88	6.80	-	7.76	6.92
Temperature, field	Deg C	--	8.81	8.81	11.60	-	19.31	17.08
Temperature, field	Deg C	--	8.81	8.81	11.60	-	19.31	17.08
Total dissolved solids, field (TDS)	mg/L	--	465	465	-	-	2.25	-
Turbidity, field	NTU	--	29.9	29.9	18.4	-	351	77.3
General Chemistry								
Alkalinity (as CaCO ₃ pH=8.3)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	-	46	59
Alkalinity, total (as CaCO ₃)	mg/L	--	180	180	370	-	1200	1500
Biochemical oxygen demand (BOD)	mg/L	--	4.8	4.8	5.6	-	13	3.4
Chemical oxygen demand (COD)	mg/L	--	43	50	71	-	89	29
Chloride (dissolved)	mg/L	250	25	26	79	-	37	28
Conductivity	uS/cm	--	530	530	1500	-	3800	4000
Hardness (dissolved)	mg/L	--	450	430	610	-	85.3	78.8
Hydroxide (as CaCO ₃)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	-	ND (1.0)	ND (1.0)
Sulphate (Dissolved)	mg/L	500	51	52	280	-	840 ^a	730 ^a
Un-ionized Sulphide as H ₂ S	mg/L	0.05	ND (0.0050)	ND (0.0050) J	0.20 J ^a	-	0.012 J-	0.024
Total Sulfide as H ₂ S	mg/L	--	ND (0.0020)	ND (0.0020) J	0.30 J-	-	0.086 J-	0.044
Total Sulfide as H ₂ S (calculated)	mg/L	--	ND (0.0050)	ND (0.0050) J	0.19 J-	-	0.011 J-	0.023
Total Sulfide as S	mg/L	--	ND (0.0018)	ND (0.0018) J	0.28 J-	-	0.081 J-	0.041
Total dissolved solids (TDS)	mg/L	--	270	310	960	-	3800	360
Total suspended solids (TSS)	mg/L	--	18	16	46	-	260	24
Nutrients								
Ammonia-N	mg/L	--	0.65	0.79	2.5	-	0.38	0.31
Bicarbonate (as CaCO ₃)	mg/L	--	220	220	460	-	1300	1600
Carbonate (as CaCO ₃)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	-	55	71
Nitrate (as N)	mg/L	10	0.728	0.722	ND (0.020) J	-	ND (0.020)	ND (0.020)
Nitrite (as N)	mg/L	1	0.0086	0.0094	ND (0.0050) J	-	0.0057	0.0420
Nitrite/Nitrate	mg/L	10	0.736	0.732	ND (0.020) J	-	0.021	0.035
Orthophosphate	mg/L	--	ND (0.0030)	ND (0.0030)	ND (0.0030) J	-	0.21	0.16
Dissolved Metals								
Aluminum (dissolved)	ug/L	9500	-	-	21.5	-	-	-
Antimony (dissolved)	ug/L	8	-	-	ND (1.0)	-	-	-
Arsenic (dissolved)	ug/L	10	-	-	0.91	-	-	-
Barium (dissolved)	ug/L	1000	-	-	61.4	-	-	-
Beryllium (dissolved)	ug/L	8	-	-	ND (0.20)	-	-	-
Bismuth (dissolved)	ug/L	--	-	-	ND (2.0)	-	-	-
Boron (dissolved)	ug/L	5000	-	-	307	-	-	-
Cadmium (dissolved)	ug/L	5	-	-	ND (0.020)	-	-	-
Calcium (dissolved)	ug/L	--	138000	132000	189000	-	21500	19300
Chromium (dissolved)	ug/L	50	-	-	ND (2.0)	-	-	-
Cobalt (dissolved)	ug/L	20 (l)	-	-	3.62	-	-	-
Copper (dissolved)	ug/L	1500	-	-	ND (0.40)	-	-	-
Iron (dissolved)	ug/L	6500	-	-	36400 ^a	-	-	-
Lead (dissolved)	ug/L	10	-	-	ND (0.40)	-	-	-
Lithium (dissolved)	ug/L	8	-	-	ND (4.0)	-	-	-
Magnesium (dissolved)	ug/L	--	25300	24200	33600	-	7700	7410
Manganese (dissolved)	ug/L	1500	-	-	10100 ^a	-	-	-
Mercury (dissolved)	ug/L	1	-	-	ND (0.0019) J	-	-	-
Molybdenum (dissolved)	ug/L	250	-	-	ND (2.0)	-	-	-
Nickel (dissolved)	ug/L	80	-	-	ND (2.0)	-	-	-
Phosphorus (dissolved)	ug/L	--	-	-	34	-	-	-
Potassium (dissolved)	ug/L	--	-	-	6980	-	-	-
Selenium (dissolved)	ug/L	10	-	-	0.22	-	-	-
Silicon (dissolved)	ug/L	--	-	-	5780	-	-	-
Silver (dissolved)	ug/L	20	-	-	ND (0.040)	-	-	-
Sodium (dissolved)	ug/L	200000	-	-	72500	-	-	-
Strontium (dissolved)	ug/L	2500	-	-	724	-	-	-
Sulfur (dissolved)	ug/L	--	-	-	106000	-	-	-
Thallium (dissolved)	ug/L	--	-	-	ND (0.020)	-	-	-
Tin (dissolved)	ug/L	2500	-	-	ND (10)	-	-	-
Titanium (dissolved)	ug/L	--	-	-	ND (10)	-	-	-
Uranium (dissolved)	ug/L	20	-	-	ND (0.20)	-	-	-
Vanadium (dissolved)	ug/L	20	-	-	ND (10)	-	-	-
Zinc (dissolved)	ug/L	3000	-	-	ND (10)	-	-	-
Zirconium (dissolved)	ug/L	--	-	-	0.31	-	-	-

Table 3

Leak Detection System Analytical Results
2022 Operations and Monitoring Report
Upland Original and New Landfills
Campbell River, British Columbia

Sample Location: Sample ID: Sample Date: Parameters	Units	BC CSR ⁽¹⁾ DW a	Original Landfill			New Landfill			
			S01-17			LDS			
			WL-11222680-230622-CXW-01 06/23/2022 ^a	WL-11222680-230622-CXW-02 06/23/2022 ^a Duplicate	WL-11222680-171122-CXW-02 11/17/2022	Dry ^b 04/01/2022	WL-11222680-230622-CXW-05 06/23/2022 ^a	WL-11222680-080922-CXW-01 09/08/2022 ^a	Dry ^b 11/17/2022
Total Metals									
Aluminum	ug/L	9500	116	119	84.6	-	13500 ^a	1630	-
Antimony	ug/L	6	ND (0.50)	ND (0.50)	ND (1.0)	-	ND (2.5)	3.4	-
Arsenic	ug/L	10	0.63	0.63	1.03	-	95.5 ^a	81.1 ^a	-
Barium	ug/L	1000	23.5	22.9	59.1	-	54.7	22.2	-
Beryllium	ug/L	8	ND (0.10)	ND (0.10)	ND (0.20)	-	1.45	ND (0.50)	-
Bismuth	ug/L	-	ND (1.0)	ND (1.0)	ND (2.0)	-	ND (5.0)	ND (5.0)	-
Boron	ug/L	5000	88	87	221	-	1280	652	-
Cadmium	ug/L	5	ND (0.010)	ND (0.010)	ND (0.020)	-	ND (0.050)	ND (0.050)	-
Calcium	ug/L	--	78300	77100	186000	-	24700	18600	-
Chromium	ug/L	50	ND (1.0)	ND (1.0)	ND (2.0)	-	9.8	ND (5.0)	-
Cobalt	ug/L	20 (i)	1.97	1.89	3.60	-	9.0	1.7	-
Copper	ug/L	1500	2.19	2.09	1.0	-	54.0	7.8	-
Iron	ug/L	6500	6920 ^a	6990 ^a	35100 ^a	-	14800 ^a	1200	-
Lead	ug/L	10	0.36	0.35	ND (0.40)	-	26.5 ^a	2.9	-
Lithium	ug/L	8	ND (2.0)	ND (2.0)	ND (4.0)	-	72 ^a	95 ^a	-
Magnesium	ug/L	--	13900	13300	32500	-	11500	8300	-
Manganese	ug/L	1500	3760 ^a	3600 ^a	9540 ^a	-	702	289	-
Mercury	ug/L	1	ND (0.0019)	ND (0.0019)	ND (0.0019)	-	ND (0.019)	ND (0.019) J	-
Molybdenum	ug/L	250	ND (1.0)	ND (1.0)	ND (2.0)	-	347 ^a	365 ^a	-
Nickel	ug/L	80	ND (1.0)	ND (1.0)	ND (2.0)	-	17.1	ND (5.0)	-
Phosphorus	ug/L	--	62	62	43	-	454	180	-
Potassium	ug/L	--	3660	3580	6850	-	3300	3050	-
Selenium	ug/L	10	ND (0.10)	ND (0.10)	0.20	-	0.89	0.68	-
Silicon	ug/L	--	2480	2460	5650	-	43700	24500	-
Silver	ug/L	20	ND (0.020)	ND (0.020)	ND (0.040)	-	ND (0.10)	ND (0.10)	-
Sodium	ug/L	200000	26300	25100	70200	-	909000 ^a	964000 ^a	-
Strontium	ug/L	2500	269	261	697	-	416	400	-
Sulphur	ug/L	--	21200	19900	101000	-	273000	240000	-
Thallium	ug/L	--	ND (0.010)	ND (0.010)	ND (0.020)	-	0.102	ND (0.050)	-
Tin	ug/L	2500	ND (5.0)	ND (5.0)	ND (10)	-	ND (25)	ND (25)	-
Titanium	ug/L	--	8.4	8.8	ND (10)	-	181	26	-
Uranium	ug/L	20	ND (0.10)	ND (0.10)	ND (0.20)	-	165 ^a	160 ^a	-
Vanadium	ug/L	20	ND (5.0)	ND (5.0)	ND (10)	-	29 ^a	ND (25) ^a	-
Zinc	ug/L	3000	ND (5.0)	ND (5.0)	ND (10)	-	97	29	-
Zirconium	ug/L	--	0.11	0.11	0.31	-	8.88	3.24	-
PHCs									
Extractable Petroleum Hydrocarbons (C10-C19)	ug/L	5000	ND (200)	ND (200)	ND (200)	-	ND (200)	ND (200)	-
Extractable Petroleum Hydrocarbons (C19-C32)	ug/L	--	ND (200)	ND (200)	ND (200)	-	ND (200)	ND (200)	-
LEPH (C19-C32 less PAH)	ug/L	--	ND (200)	ND (200)	ND (200)	-	ND (200)	ND (200)	-
LEPH (C10-C19 less PAH)	ug/L	--	ND (200)	ND (200)	ND (200)	-	ND (200)	ND (200)	-
Total Petroleum Hydrocarbons VPH (C6-C10) Less BTEX	ug/L	--	-	-	ND (300)	-	-	-	-
Total Petroleum Hydrocarbons VH (C6-C10)	ug/L	15000	-	-	ND (300)	-	-	-	-
VOCs									
Benzene	ug/L	5	-	-	ND (0.40)	-	-	-	-
Ethylbenzene	ug/L	140	-	-	ND (0.40)	-	-	-	-
m&p-Xylenes	ug/L	--	-	-	ND (0.40)	-	-	-	-
Methyl tert butyl ether (MTBE)	ug/L	95	-	-	ND (4.0)	-	-	-	-
o-Xylene	ug/L	--	-	-	ND (0.40)	-	-	-	-
Styrene	ug/L	800	-	-	ND (0.40)	-	-	-	-
Toluene	ug/L	60	-	-	ND (0.40)	-	-	-	-
Xylenes (total)	ug/L	90	-	-	ND (0.40)	-	-	-	-
PAHs									
1-Methylnaphthalene	ug/L	5.5	-	-	0.12	-	-	-	-
2-Methylnaphthalene	ug/L	15	-	-	ND (0.10)	-	-	-	-
Acenaphthene	ug/L	250	ND (0.050)	ND (0.050)	0.22	-	1.9	ND (0.050)	-
Acenaphthylene	ug/L	--	-	-	ND (0.050)	-	-	-	-
Acridine	ug/L	--	ND (0.050)	ND (0.050)	0.20	-	ND (0.050)	ND (0.050)	-
Anthracene	ug/L	1000	0.024	0.025	0.029	-	0.22	ND (0.010)	-
Benzo(a)anthracene	ug/L	0.07	ND (0.010)	ND (0.010)	ND (0.010)	-	0.027	ND (0.010)	-
Benzo(b)pyrene	ug/L	0.01	ND (0.0050)	ND (0.0050)	ND (0.0050)	-	0.012 ^a	ND (0.0050)	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	0.07	-	-	ND (0.030)	-	-	-	-
Benzo(b)pyridine (Quinoline)	ug/L	0.05	-	-	0.025	-	-	-	-
Benzo(g,h,i)perylene	ug/L	--	-	-	ND (0.050)	-	-	-	-
Benzo(k)fluoranthene	ug/L	--	-	-	ND (0.050)	-	-	-	-
Chrysene	ug/L	7	-	-	ND (0.020)	-	-	-	-
Dibenz(a,h)anthracene	ug/L	0.01	-	-	ND (0.0030)	-	-	-	-
Fluoranthene	ug/L	150	ND (0.020)	ND (0.020)	0.47	-	0.47	ND (0.020)	-
Fluorene	ug/L	150	ND (0.050)	ND (0.050)	0.053 J+	-	1.6	ND (0.050)	-
Indene(1,2,3-cd)pyrene	ug/L	--	-	-	ND (0.050)	-	-	-	-
Naphthalene	ug/L	80	ND (0.10)	ND (0.10)	0.65	-	3.5	ND (0.10)	-
PAH high molecular weight	ug/L	--	-	-	ND (0.050)	-	-	-	-
PAH low molecular weight	ug/L	--	-	-	1.3	-	-	-	-
Phenanthrene	ug/L	--	ND (0.050)	ND (0.050)	ND (0.050)	-	3.1	ND (0.050)	-
Pyrene	ug/L	100	ND (0.020)	ND (0.020)	0.32	-	0.32	ND (0.020)	-
Total PAH	ug/L	--	-	-	1.3	-	-	-	-

Table 4

**Groundwater Analytical Results
2022 Operations and Monitoring Report
Upland Original and New Landfills
Campbell River, British Columbia**

[illegible]

Table 4
Groundwater Analytical Results
2022 Operations and Monitoring Report
Upland Original and New Landfills
Campbell River, British Columbia

Sample Location:			MW10-17										MW11-19										MW12-22 ¹									
Sample ID:			WG-11222680-010422-MJ-08	WG-11222680-220622-CXW-03	WG-11222680-070922-CXW-02	WG-11222680-161122-CXW-02	WG-11222680-161122-CXW-03	WG-11222680-010422-MJ-07	WG-11222680-220622-CXW-02	WG-11222680-070922-CXW-01	WG-11222680-161122-CXW-01	WG-11222680-070922-CXW-03	WG-11222680-161122-CXW-04																			
Sample Date:		BC CSR ⁽¹⁾	04/01/2022	06/22/2022	09/07/2022	11/16/2022	11/16/2022 Duplicate	04/01/2022	06/22/2022	09/07/2022	11/16/2022	09/07/2022	11/16/2022																			
Parameters	Units	DW a																														
Field Parameters																																
Conductivity, field	uS/cm	--	129	135	415	111	111	153	211	560	288	311	174																			
Dissolved oxygen (DO), field	mg/L	--	-	-	12.00	3.38	3.38	-	-	9.75	6.1	16.09	10.57																			
Oxidation reduction potential (ORP), field	millivolts	--	215	324	132	272	272	222	352	176	287	158	293																			
pH, field	s.u.	--	7.75	7.85	7.50	7.55	7.55	7.21	7.38	7.20	7.32	7.35	7.61																			
Temperature, field	Deg C	--	11.48	12.99	12.78	11.84	11.84	12.62	14.68	14.47	13.05	10.80	9.70																			
Total dissolved solids, field (TDS)	mg/L	--	84	87	-	-	-	100	137	-	-	-	-																			
Turbidity, field	NTU	--	9.7	11.1	4.4	4.0	4.0	954	319	806	1000	17.8	10.2																			
General Chemistry																																
Alkalinity (as CaCO3 pH=8.3)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)																			
Alkalinity, total (as CaCO3)	mg/L	--	58	53	23	99	100	64	77	290	150	140	83																			
Chloride (dissolved)	mg/L	250	3.6	16	32	65	69	7.2	7.7	3.7	1.6	2.1	11																			
Conductivity	uS/cm	--	130	130	440	1200	1200	160	200	570	310	300	180																			
Hardness (dissolved)	mg/L	--	57.0	54.6	175	638	623	66.8	89.4	273	149	136	79.3																			
Hydroxide (as CaCO3)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)																			
Sulfate (dissolved)	mg/L	500	4.2	4.9	130	400	420	6.4	6.4	5.5	6.0	6.0	4.8																			
Un-ionized Sulphide as H2S	mg/L	0.05	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.034	0.034	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)																			
Total Sulfide as H2S	mg/L	--	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0019)	ND (0.0019)	0.074	0.098	ND (0.0020)	ND (0.0019)	ND (0.0020)	ND (0.0019)																			
Total Sulfide as H2S (calculated)	mg/L	--	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.032	0.032	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)																			
Total Sulfide as S	mg/L	--	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	0.069	0.092	ND (0.0018)	ND (0.018)	ND (0.0018)	ND (0.0018)																			
Total dissolved solids (TDS)	mg/L	--	76	88	330	930	940	110	120	3000	190	200	90																			
Nutrients																																
Ammonia-N	mg/L	--	ND (0.015)	ND (0.015)	ND (0.015)	0.023	0.020	0.14	ND (0.015)	ND (0.015)	0.037	ND (0.015)	ND (0.015)																			
Bicarbonate (as CaCO3)	mg/L	--	71	65	28	120	120	78	93	350	180	180	100																			
Carbonate (as CaCO3)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)																			
Nitrate (as N)	mg/L	10	0.142	0.514	1.26	0.267 J	0.266 J	0.590	0.601	1.66	0.781 J	0.480	0.612 J																			
Nitrite (as N)	mg/L	1	ND (0.0050)	ND (0.0050)	ND (0.0050)	0.0107 J	0.0114 J	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050) J	ND (0.0050)	ND (0.0050) J																			
Nitrite/Nitrate	mg/L	10	0.142	0.514	1.26	0.278 J	0.278 J	0.590	0.601	1.66	0.781 J	0.480	0.612 J																			
Orthophosphate	mg/L	--	0.012	0.012	0.0059	0.0071 J	0.0067 J	0.010	0.014	0.013	0.0084 J	0.0053	0.0065 J																			
Dissolved Metals																																
Aluminum (dissolved)	ug/L	9500	3.6	3.4	ND (3.0)	ND (3.0)	ND (3.0)	5.4	7.7	8.1	39.3	ND (3.0)	3.0																			
Antimony (dissolved)	ug/L	6	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)																			
Arsenic (dissolved)	ug/L	10	0.44	0.70	0.67	1.00	1.01	0.20	0.20	0.24	0.18	ND (0.10)	ND (0.10)																			
Barium (dissolved)	ug/L	1000	2.8	3.0	8.5	25.5	25.7	4.4	6.2	18.6	9.6	11.7	4.5																			
Beryllium (dissolved)	ug/L	8	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)																			
Bismuth (dissolved)	ug/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)																			
Boron (dissolved)	ug/L	5000	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)																			
Cadmium (dissolved)	ug/L	5	ND (0.010)	ND (0.010)	0.011	0.022	0.020	ND (0.010)	0.013	ND (0.010)	0.017	0.017	ND (0.010)																			
Calcium (dissolved)	ug/L	--	18400	17500	57900	207000	202000	21200	28200	88300	47300	44600	25300																			
Chromium (dissolved)	ug/L	50	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.0	ND (1.0)	ND (1.0)																			
Cobalt (dissolved)	ug/L	20 (l)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	0.20	ND (0.20)																			
Copper (dissolved)	ug/L	1500	0.31	ND (0.20)	3.99	7.66	7.62	0.28	0.43	0.23	0.34	ND (0.20)	ND (0.20)																			
Iron (dissolved)	ug/L	6500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	6.4	15.5	9.6	43.8	ND (5.0)	ND (5.0)																			
Lead (dissolved)	ug/L	10	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)																			
Lithium (dissolved)	ug/L	8	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)																			
Magnesium (dissolved)	ug/L	--	2690	2660	7370	29300	28600	3350	4580	12700	7410	5930	3930																			
Manganese (dissolved)	ug/L	1500	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.0	7.7	2.2	61.5	13.0																			
Mercury (dissolved)	ug/L	1	ND (0.0019)	ND (0.0019)	0.0101	0.0319	0.0313	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)																			
Molybdenum (dissolved)	ug/L	250	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)																			
Nickel (dissolved)	ug/L	80	ND (1.0)	ND (1.0)	ND (1.0)	1.0	1.1	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)																			
Phosphorus (dissolved)	ug/L	--	13	14	22	16	14	10	15	15	ND (10)	ND (10)	ND (10)																			
Potassium (dissolved)	ug/L	--	313	329	531	895	884	353	440	763	523	507	331																			
Selenium (dissolved)	ug/L	10	0.12	0.21	ND (0.10)	0.11	ND (0.10)	0.22	0.24	0.19	0.17	0.24	ND (0.10)																			
Silicon (dissolved)	ug/L	--	6700	6420	4620	7000	6960	9510	9810	7640	9450	6450	7480																			
Silver (dissolved)	ug/L	20	ND (0.020)	ND (0.020)	ND (0.020)	0.048	0.048	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)																			
Sodium (dissolved)	ug/L	200000	4850	4940	7980	15700	15500	5550	6060	11800	6360	5630	5630																			
Strontium (dissolved)	ug/L	2500	25.2	25.1	86.7	292	303	32.8	44.9	148	70.7	65.1	33.3																			
Sulfur (dissolved)	ug/L	--	ND (3000)	ND (3000)	44100	151000	145000	ND (3000)	4500	ND (3000)	ND (3000)	ND (3000)	ND (3000)																			
Thallium (dissolved)	ug/L	--	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)																			
Tin (dissolved)	ug/L	2500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)																			
Titanium (dissolved)	ug/L	--	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)																			
Uranium (dissolved)	ug/L	20	ND (0.10)	ND (0.10)	ND (0.10)	0.50	0.50	ND (0.10)	ND (0.10)	0.35	0.11	ND (0.10)	ND (0.10)																			
Vanadium (dissolved)	ug/L	20	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)																			
Zinc (dissolved)	ug/L	3000	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)																			
Zirconium (dissolved)	ug/L	--	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)																			
PHCs																																
EPHw10-19	ug/L	5000	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)																			
EPHw19-32	ug/L	--	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	220	230	ND (200)	ND (200)	ND (200)	ND (200)																			
HEPHw	ug/L	--	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	220	230	ND (200)	ND (200)	ND (200)	ND (200)																			
LEPHw	ug/L	--	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)																			
PAHs																																
1-Methylnaphthalene	ug/L	5.5	-	-	-	ND (0.050)	ND (0.050)	-	-	-	ND (0.050)	-	ND (0.050)																			
2-Methylnaphthalene	ug/L	15	-	-	-	ND (0.10)	ND (0.10)	-	-	-	ND (0.10)	-	ND (0.10)																			
Acenaphthene	ug/L	250	ND (																													

Table 5
Surface Water Analytical Results
2022 Operations and Monitoring Report
Upland Original and New Landfills
Campbell River, British Columbia

Sample Location: Sample ID: Sample Date:	BC CSR ⁽¹⁾ DW a	SW15-01 [McIvor Lake]			SW15-02 [Rico Lake]		
		WS-11222680-010422-MJ-02 04/01/2022 ²	WS-11222680-230622-CXW-02 06/23/2022 ²	WS-11222680-171122-CXW-02 11/17/2022	WS-11222680-010422-MJ-01 04/01/2022 ²	WS-11222680-230622-CXW-01 06/23/2022 ²	WS-11222680-171122-CXW-01 11/17/2022
Parameters	Units						
Field Parameters							
Conductivity, field	uS/cm	--	43	58	50	56	67
Dissolved oxygen (DO), field	mg/L	--	10.50	14.53	24.09	9.66	6.28
Oxidation reduction potential (ORP), field	millivolts	--	221	8	235	-54	294
pH, field	s.u.	--	7.80	7.76	7.53	7.39	7.22
Temperature, field	Deg C	--	7.14	14.21	7.18	15.15	5.78
Total dissolved solids, field (TDS)	mg/L	--	28	34	33	36	-
Turbidity, field	NTU	--	0.7	1.9	6.4	8.8	1.9
General Chemistry							
Alkalinity (as CaCO ₃ pH=8.3)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Alkalinity, total (as CaCO ₃)	mg/L	--	20	23	14	15	18
Chloride (dissolved)	mg/L	250	ND (1.0)	1.0	6.1	5.1	ND (1.0)
Conductivity	uS/cm	--	47	50	53	52	54
Hardness	mg/L	--	21.3	-	15.1	-	-
Hardness (dissolved)	mg/L	--	21.1	22.2	15.1	14.7	23.1
Hydroxide (as CaCO ₃)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Sulfate (dissolved)	mg/L	500	2.2	3.7	1.1	3.1	2.4
Un-ionized Sulphide as H ₂ S	mg/L	0.05	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Total Sulfide as H ₂ S	mg/L	--	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0018)
Total Sulfide as H ₂ S (calculated)	mg/L	--	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Total Sulfide as S	mg/L	--	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)	ND (0.0018)
Total dissolved solids (TDS)	mg/L	--	40	50	28	52	-
Total suspended solids (TSS)	mg/L	--	-	2.5 J	1.4	R	2.3
Nutrients							
Ammonia-N	mg/L	--	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)
Bicarbonate (as CaCO ₃)	mg/L	--	24	28	18	18	22
Carbonate (as CaCO ₃)	mg/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nitrate (as N)	mg/L	10	0.179	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020) J
Nitrite (as N)	mg/L	1	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050) J
Nitrite/Nitrate	mg/L	10	0.179	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020) J
Orthophosphate	mg/L	--	ND (0.0030)	ND (0.0030)	0.0031	ND (0.0030)	ND (0.0030)
Dissolved Metals							
Calcium (dissolved)	ug/L	--	7170 J	7590	4770	4290 J	7900
Magnesium (dissolved)	ug/L	--	771 J	780	1170	1070 J	826
Total Metals							
Aluminum	ug/L	9500	92.4	22.6	15.0	12.2	397
Antimony	ug/L	6	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Arsenic	ug/L	10	0.10	0.13	0.11	ND (0.10)	0.21
Barium	ug/L	1000	2.8	2.7	2.6	2.1	4.3
Beryllium	ug/L	8	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Bismuth	ug/L	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Boron	ug/L	5000	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Cadmium	ug/L	5	ND (0.010)	0.011	ND (0.010)	ND (0.010)	0.019
Calcium	ug/L	--	7210	7630	4870	4270	7950
Chromium	ug/L	50	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Cobalt	ug/L	20 (I)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	0.21
Copper	ug/L	1500	0.71	0.57	0.64	0.53	2.11
Iron	ug/L	6500	88	16	321	152	427
Lead	ug/L	10	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	0.26
Lithium	ug/L	8	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Magnesium	ug/L	--	812	823	1160	1060	916
Manganese	ug/L	1500	5.3	2.2	33.9	17.4	22.5
Mercury	ug/L	1	0.0032	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)
Molybdenum	ug/L	250	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel	ug/L	80	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Phosphorus	ug/L	--	ND (10)	ND (10)	12	ND (10)	26
Potassium	ug/L	--	78	82	164	131	95
Selenium	ug/L	10	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Silicon	ug/L	--	1700	1820	706	1570	1730
Silver	ug/L	20	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
Sodium	ug/L	200000	905	783	4240	3880	810
Strontium	ug/L	2500	10.9	11.5	16.5	13.9	12.5
Sulphur	ug/L	--	ND (3000)	ND (3000)	ND (3000)	ND (3000)	ND (3000)
Thallium	ug/L	--	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Tin	ug/L	2500	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Titanium	ug/L	--	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	24.5
Uranium	ug/L	20	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Vanadium	ug/L	20	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Zinc	ug/L	3000	ND (5.0)	21.0	ND (5.0)	ND (5.0)	5.6
Zirconium	ug/L	--	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)

**Soil Gas Monitoring Analytical Results
2022 Operations and Monitoring Report
Upland Original and New Landfills
Campbell River, British Columbia**

			Pressure	Methane	Carbon Dioxide	Oxygen	Hydrogen Sulfide	Carbon Monoxide	Balance
Location	Date	Time Purged ⁽¹⁾	("W.C.)	(% v/v)	(% v/v)	(% v/v)	(ppm)	(ppm)	(% v/v)
LFG1-22	18-Nov-22	8:10	N/A	0.0	0.0	0.0	-1.0	-1.0	N/A
LFG2-22	18-Nov-22	9:45	N/A	0.2	2.1	17.5	0.0	0.0	80.20

Notes:

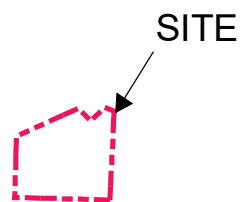
- %v/v Percent volume.
- Data not available.
- (1) The volume of the well was used to calculate purge volume.

Analytical Results Notes
2022 Operations and Monitoring Report
Upland Original and New Landfills
Campbell River, British Columbia

Notes:

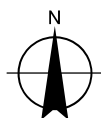
- (1) British Columbia Contaminated Site Regulation (Nov 2017) Column 6 for the protection of drinking water (DW).
- ^a Exceeds Freshwater Aquatic Life (FAW) CSR Guideline.
- ND (1.0) Not detected at the associated reporting limit.
- ND (0.08)** Laboratory detection limit exceeds guideline
- J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- J- The result is an estimated quantity, but the result may be biased low.
- J+ The result is an estimated quantity, but the result may be biased high.
- Concentration exceeds standard.
- Currently no standard.
- (i) B.C. Ministry of Environment and Climate Change, 2021. Protocol 9 for Contaminated Sites Version 2.
- LDS Leak Detection Sump
- 1 Inaccessible due to super-sacs obstructing the sump.
- 2 Dry during the monitoring event. A sample was not possible.
- 3 Sample not collected as treated leachate was not being discharged in to the pond.
- 4 MW12-22 was installed in the early Summer of 2022. Samples were not possible during the Q1 and Q2 events, as it was not yet installed.
- 5 Sampling of this location as part of the EMP is only required in November (Q4).
- 6 This monitoring location is typically sampled for the full CSR dissolved metals list, VOCs, and the full PAH laboratory list. Due to field error, these analytes were not requested.

Figures



Paper Size ANSI A
0 400 800 1,200 1,600
Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 10N

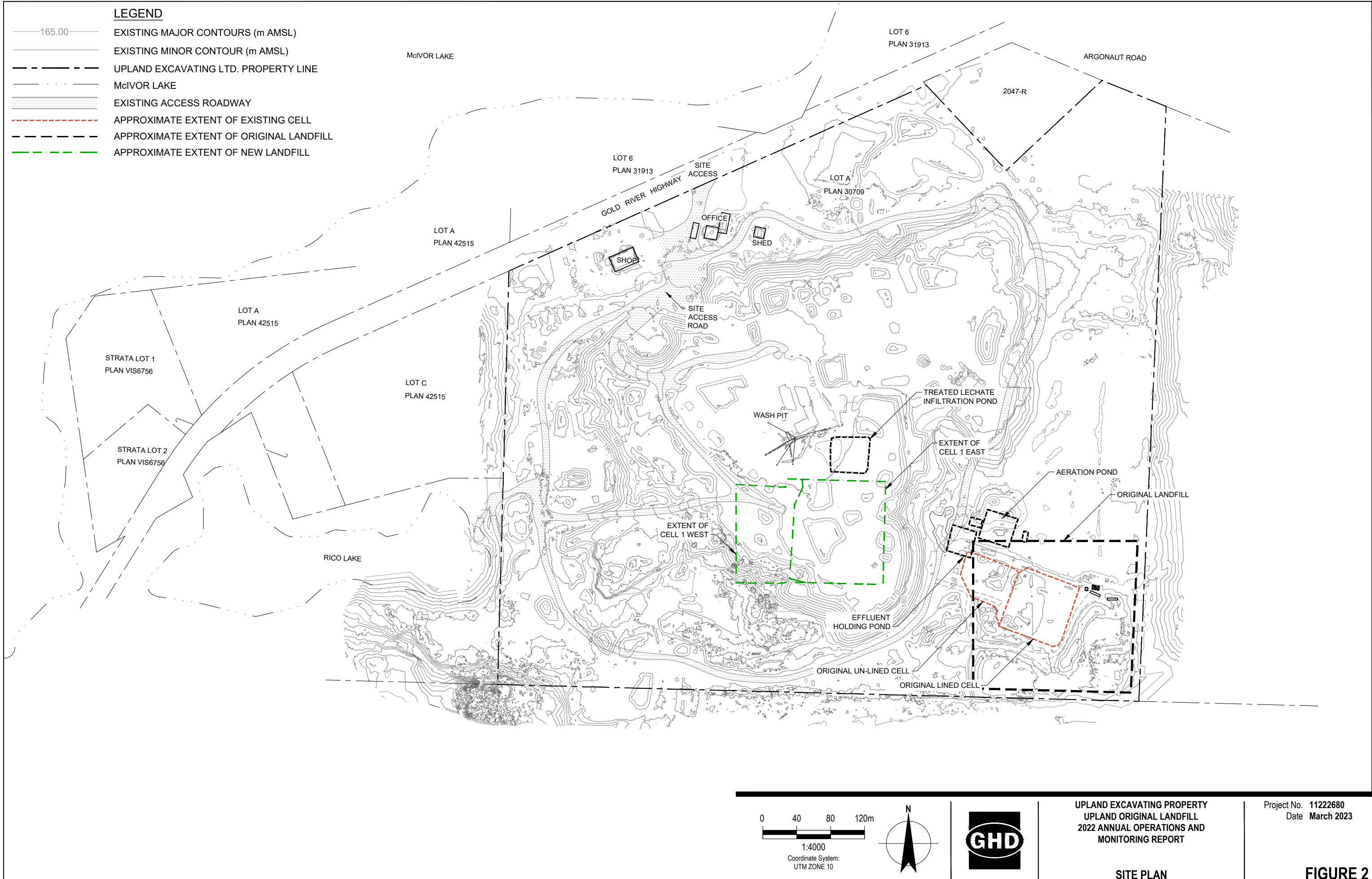


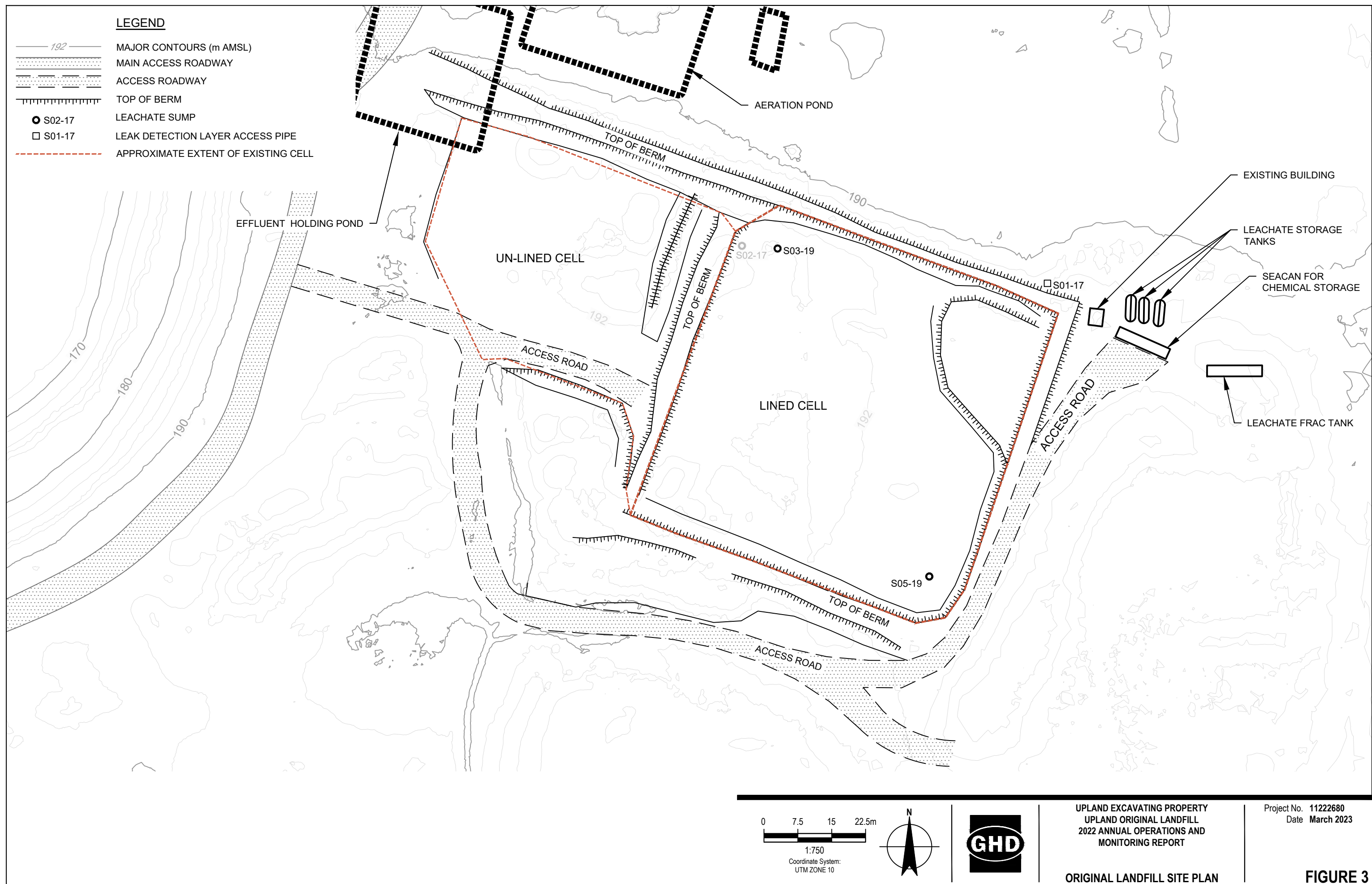
UPLAND EXCAVATING PROPERTY
2022 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL LANDFILL

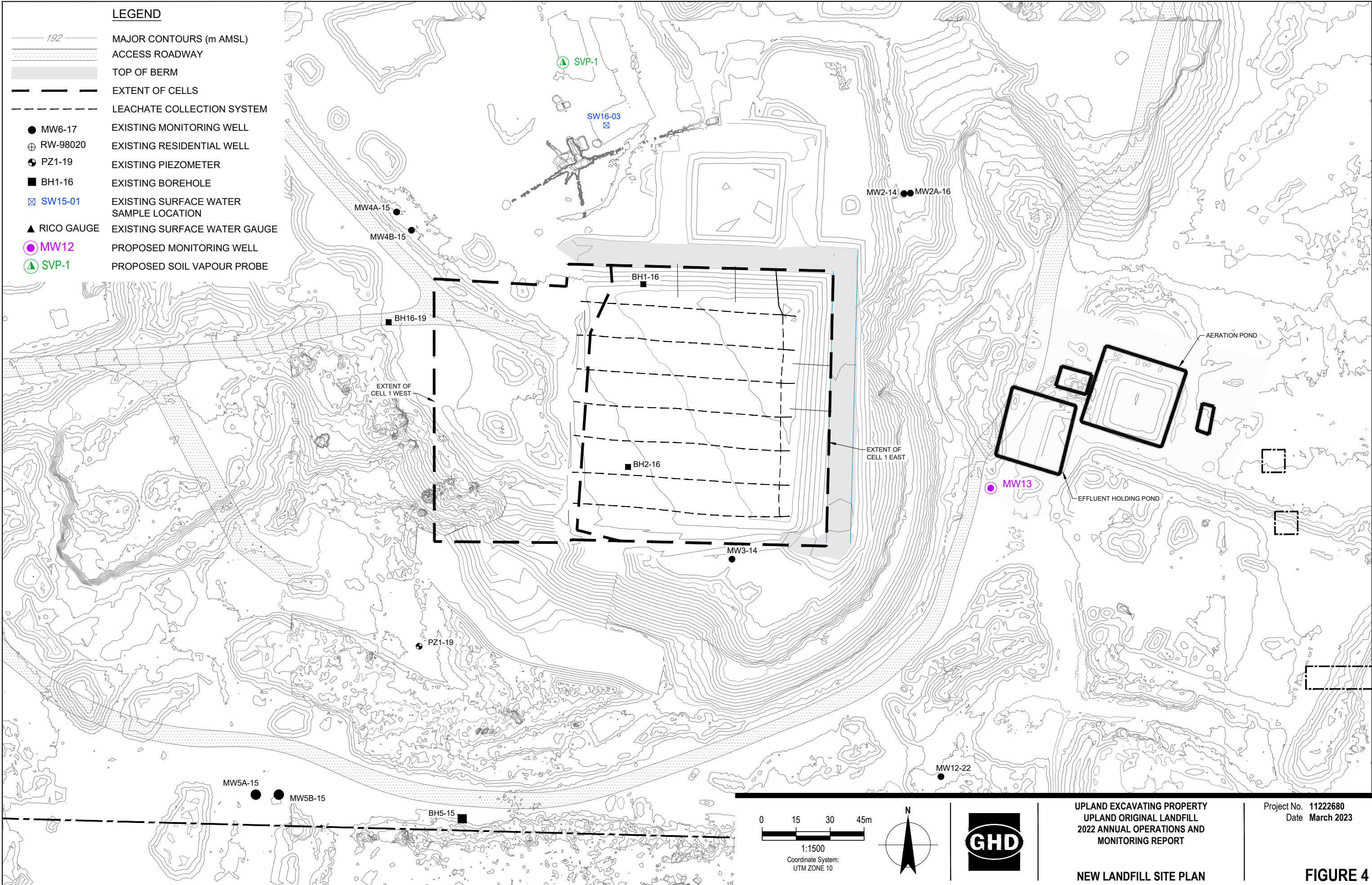
Project No. 11222680
Revision No. -
Date Dec 1, 2022

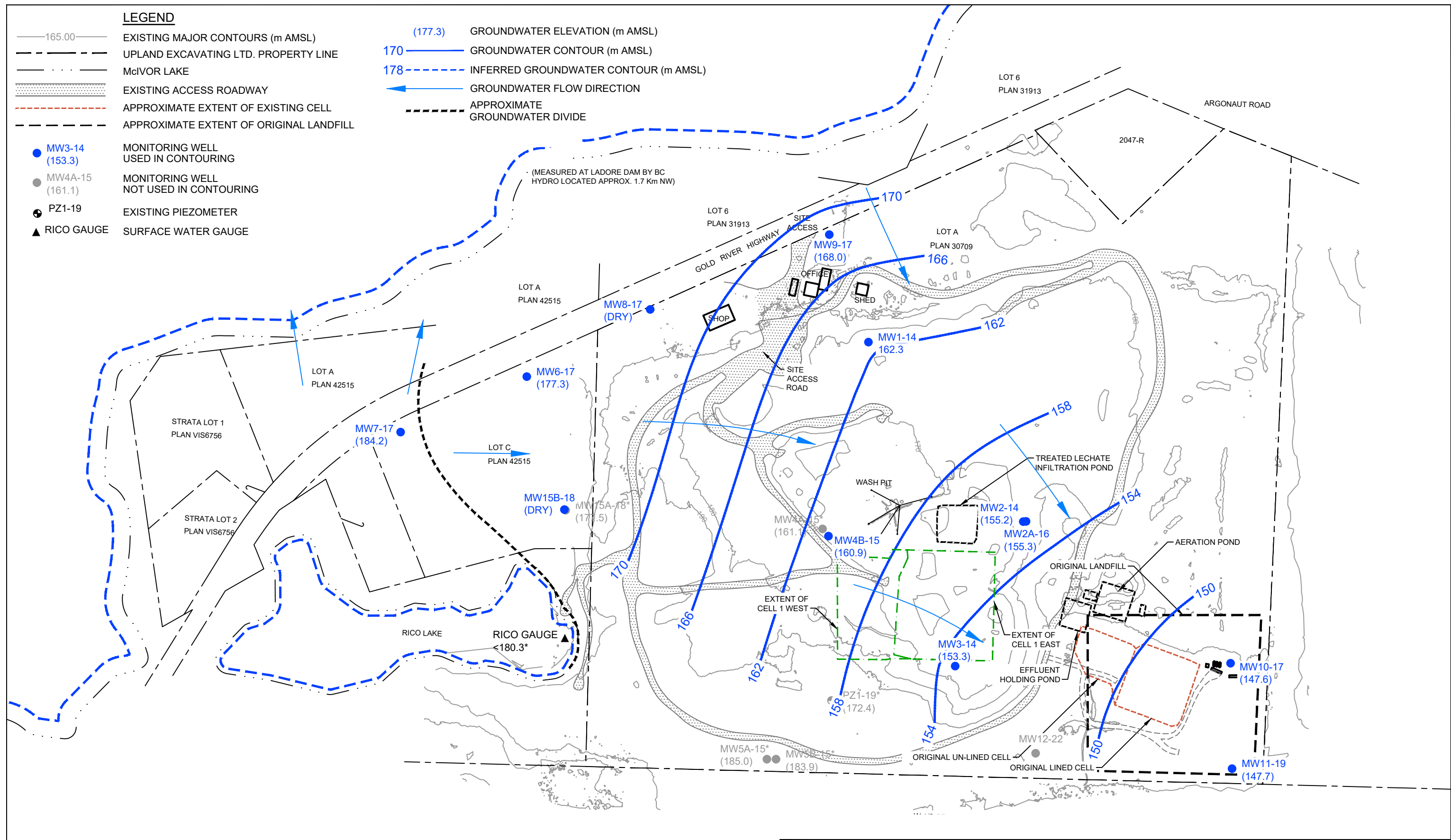
SITE LOCATION MAP

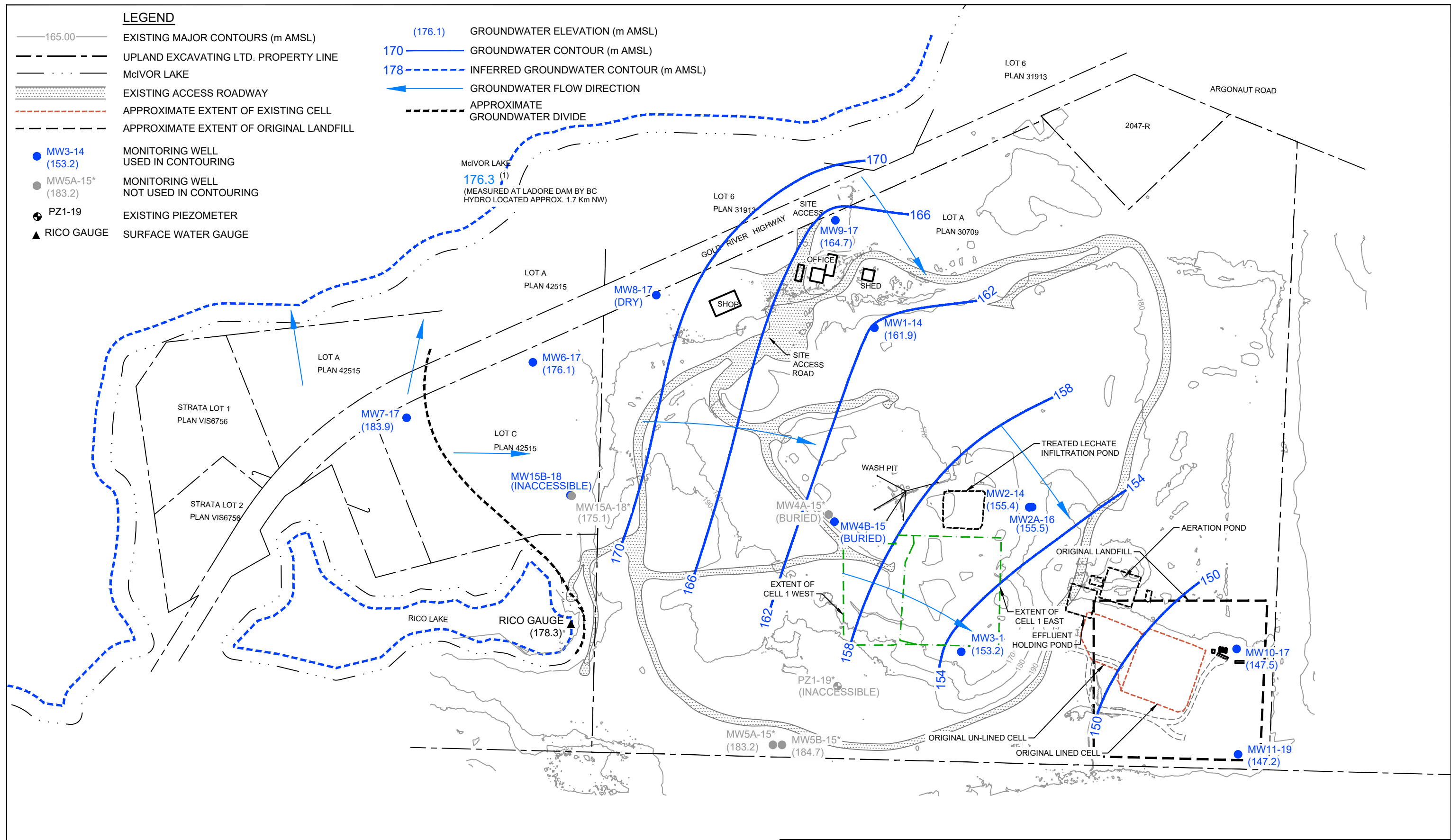
FIGURE 1



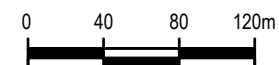




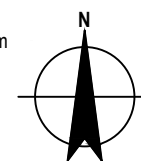




NOTE:
 1. BASED ON BC HYDRO RECORD OF WATER ELEVATIONS AT LADORE DAM RECORDED EVERY 3 HOURS.
 (https://www.bchydro.com/energy-in-bc/our_system/transmission_reservoir_data/previous_reservoir_elevations/vancouver_island/ladore_ldr.html)



1:4000
 Coordinate System:
 UTM ZONE 10



UPLAND EXCAVATING PROPERTY
 UPLAND ORIGINAL LANDFILL
 2022 ANNUAL OPERATIONS AND
 MONITORING REPORT

GROUNDWATER ELEVATION CONTOURS
 SAND & GRAVEL AQUIFER-NOV. 16, 2022

Project No. 11222680
 Date March 2023

FIGURE 6

Appendices

Appendix A

Operational Certificate



August 1, 2019

Tracking Number: 335965
Authorization Number: 107689

REGISTERED MAIL

UPLAND EXCAVATING LTD.
#201-909 ISLAND HIGHWAY
CAMPBELL RIVER BC V9W 2C2

Dear operational certificate holder:

Enclosed is Operational Certificate 107689 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate. An annual fee will be determined according to the Permit and Approval Fees and Charges Regulation.

This operational certificate does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the operational certificate holder. It is also the responsibility of the operational certificate holder to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

Requirements may also be specified by the *Environmental Management Act* and regulations including, but not limited to, the Contaminated Sites Regulation, Environmental Data Quality Assurance Regulation, Hazardous Waste Regulation, Landfill Gas Management Regulation, Organic Matter Recycling Regulation, Ozone Depleting Substances and Other Halocarbons Regulation, Recycling Regulation, Spill Reporting Regulation, Storage of Recyclable Material Regulation, Waste Discharge Regulation and Codes of Practice.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

Administration of this operational certificate will be carried out by staff from the Environmental Protection Division's Regional Operations Branch. Documents pertinent to the operational certificate are to be submitted by email or electronic transfer to the director, in accordance with the ministry Data & Report Submissions website at: <http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions>, or as further instructed.

If you have any questions or concerns, please contact Authorizations - South at Authorizations.South@gov.bc.ca.

Yours truly,

A handwritten signature in black ink, consisting of a stylized 'L' followed by a horizontal line.

Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

Enclosure



MINISTRY OF ENVIRONMENT &
CLIMATE CHANGE STRATEGY

OPERATIONAL CERTIFICATE

107689

Under the Provisions of the Environmental Management Act

Pursuant to the Approved

Comox Valley Regional District Solid Waste Management Plan

UPLAND EXCAVATING LTD.

**#201-909 ISLAND HIGHWAY
CAMPBELL RIVER BC V9W 2C2**

Is authorized to manage waste at the Facility located in Campbell River, British Columbia, subject to the requirements listed below. Contravention of any of these requirements is a violation of the *Environmental Management Act* and may lead to prosecution.

Pursuant to section 24(10) of the *Environmental Management Act*, this operational certificate supersedes and cancels Permit PR-10807 issued under section 14 of the *Environmental Management Act*.

1. **AUTHORIZED DISCHARGES, FACILITIES AND WORKS**

1.1 **Original Landfill**

This section applies to the Original Landfill.

1.1.1 The maximum rate of waste discharge to the Original Lined Cell is 45,000 tonnes per calendar year.

1.1.2 The characteristics of the waste discharge to the Original Lined Cell must be:

- (a) demolition waste,
- (b) construction waste,
- (c) land clearing waste,
- (d) soil in which the concentrations of all substances are less than the lowest applicable industrial land use standard specified for those substances in
 - (i) the generic numerical soil standards,
 - (ii) the matrix numerical soil standards, or

Date issued: August 1, 2019

Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

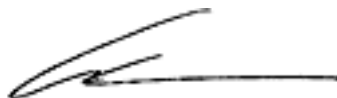
- (iii) a director's interim standard for soil,
referred to in section 41(1)(a) of the Contaminated Sites Regulation, B.C. Reg. 375/96,
 - (e) sludge from the Original Leachate Management Works, or,
 - (f) other waste as authorized in writing by the director,but does not include:
 - (g) hazardous waste except as authorized pursuant to the Hazardous Waste Regulation, controlled waste, Attractants, and,
 - (h) waste and/or recyclable material prohibited in writing by the director.
- 1.1.3 The waste discharge is authorized to the Original Lined Cell approximately located as shown on Site Plan A. Waste discharge to the Original Un-Lined Cell is not authorized.
- 1.1.4 Authorization to discharge waste to the Original Lined Cell ceases on the earlier of:
 - (i) the date the Original Lined Cell is filled to capacity with grades not steeper than 3H:1V (33%),
 - (ii) the date of commencement of waste discharge to the New Landfill.
- 1.1.5 The authorized works are:
 - (i) a lined landfill footprint with a maximum area of 0.72 ha (85 m x 85 m) including from bottom to top a base with perimeter berm, 0.3 m sand cushion layer, 0.5 mm thick coated woven polyethylene liner, 0.3 m granular leak detection layer, leak detection riser pipe, 0.5 mm thick coated woven polyethylene liner, 0.3 m sand protection layer, leachate extraction chamber, final cover, and,
 - (ii) an un-lined landfill footprint with an approximate area of 0.7 ha, final cover, and related appurtenances, approximately located as shown on Site Plan A.
- 1.1.6 The operational certificate holder must ensure the Original Landfill, excluding final cover, is complete and fully operational on or before the date of issuance of this operational certificate, and at all times thereafter, until the Original Landfill is decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.

1.2 **Original Leachate Management Works**

This section applies to the management of leachate from the Original Lined Cell.

- 1.2.1 The operational certificate holder must convey the leachate from the Original Lined Cell, that is to be discharged on the Facility site, to the Original Leachate Management Works.
- 1.2.2 The maximum rate of treated leachate effluent discharge to the treated leachate infiltration pond is 7,139 m³ per calendar year.

Date issued: August 1, 2019



Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

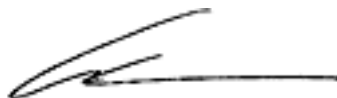
- 1.2.3 The concentration of any substance in the treated leachate effluent discharge to the treated leachate infiltration pond must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance.
- 1.2.4 The treated leachate effluent is authorized to be discharged to the treated leachate infiltration pond and infiltrated into the ground. This authorization ceases on the date the Original Leachate Management Works are decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.
- 1.2.5 The authorized works are leachate conveyance, storage, treatment and discharge works including pumps, pipes, leachate storage and treatment tanks, treated leachate infiltration pond, flow monitoring works, and related appurtenances approximately located as shown on Site Plan A.
- 1.2.6 Minimum Freeboard must be maintained at all times as follows:
treated leachate infiltration pond: 0.6 m
- 1.2.7 The operational certificate holder must ensure the Original Leachate Management Works are complete and fully operational on or before the date of commencement of discharge to the treated leachate infiltration pond, and at all times thereafter, until the Original Leachate Management Works are decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.

1.3 **New Landfill**

This section applies to the New Landfill.

- 1.3.1 The maximum rate of waste discharge to the New Landfill is: (45,000 minus the waste discharge to the Original Lined Cell) tonnes per calendar year.
- 1.3.2 The characteristics of the waste discharge to the New Landfill must be:
 - (a) demolition waste,
 - (b) construction waste,
 - (c) land clearing waste,
 - (d) soil in which the concentrations of all substances are less than the lowest applicable industrial land use standard specified for those substances in
 - (i) the generic numerical soil standards,
 - (ii) the matrix numerical soil standards, or
 - (iii) a director's interim standard for soil, referred to in section 41(1)(a) of the Contaminated Sites Regulation, B.C. Reg. 375/96,
 - (e) sludge from the New Leachate Management Works or the New Stormwater

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Management Works, or,
(f) other waste as authorized in writing by the director,
but does not include:
(g) hazardous waste except as authorized pursuant to the Hazardous Waste Regulation,
controlled waste, Attractants, and,
(h) waste and/or recyclable material prohibited in writing by the director.

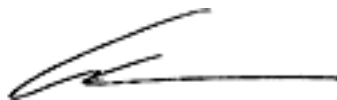
- 1.3.3 The waste discharge is authorized to the New Landfill approximately located as shown on Site Plan A.
- 1.3.4 The authorized works are a lined landfill footprint with a maximum area of 3.60 ha including from bottom to top a base with perimeter berm, secondary base liner, leak detection drainage layer and leak collection pipes and sump, primary base liner, leachate collection drainage layer and leachate collection pipes and sump, pumps, pipes, final cover, and related appurtenances, approximately located as shown on Site Plan A.
- 1.3.5 The secondary base liner and the primary base liner must each include an upper high density polyethylene double sided textured geomembrane of minimum 1.5 mm thickness and a lower geosynthetic clay liner of hydraulic conductivity less than or equal to 1×10^{-7} cm/s. However, on the south slope of the base more than 1 m above the primary base liner, the geosynthetic clay liners are not required.
- 1.3.6 The operational certificate holder must ensure the New Landfill, excluding final cover, is complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.

1.4 **New Leachate Management Works**

This section applies to the management of leachate from the New Landfill.

- 1.4.1 The operational certificate holder must convey the leachate from the New Landfill, that is to be discharged on the Facility site, to the New Leachate Management Works.
- 1.4.2 The maximum rate of treated leachate effluent discharge to the treated leachate infiltration pond is 24,633 m³ per calendar year.
- 1.4.3 The concentration of any substance in the treated leachate effluent discharge to the treated leachate infiltration pond must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance.
- 1.4.4 The treated leachate effluent is authorized to be discharged to the treated leachate infiltration

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pond and infiltrated into the ground.

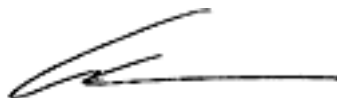
- 1.4.5 The authorized works are leachate conveyance, treatment and discharge works including pumps, pipes, leachate treatment pond(s), treated leachate infiltration pond, flow monitoring works, and related appurtenances approximately located as shown on Site Plan A.
- 1.4.6 The leachate treatment pond(s) must include from bottom to top a secondary base liner, leak detection drainage layer and leak collection pipe(s), and a primary base liner. The secondary base liner and the primary base liner must each include an upper high density polyethylene double sided textured geomembrane of minimum 1.5 mm thickness and a lower geosynthetic clay liner of hydraulic conductivity less than or equal to 1×10^{-7} cm/s.
- 1.4.7 Minimum Freeboard must be maintained at all times as follows:
 - leachate treatment pond(s): 0.6 m
 - treated leachate infiltration pond: 0.6 m
- 1.4.8 The operational certificate holder must ensure the New Leachate Management Works are complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.

1.5 **New Stormwater Management Works**

This section applies to the management of stormwater from the New Landfill.

- 1.5.1 The operational certificate holder must manage stormwater from the New Landfill such that stormwater is infiltrated into the ground with the authorized works.
- 1.5.2 The stormwater must not include leachate and the concentration of any substance in the stormwater must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance.
- 1.5.3 The authorized works are diversion berm, perimeter berm, mid slope swales, drop down channels, ditches, energy dissipation and sediment traps, stormwater infiltration area, and related appurtenances approximately located as shown on Site Plan A.
- 1.5.4 Minimum Freeboard must be maintained at all times as follows:
 - stormwater infiltration area: 0.6 m
 - all other authorized works: 0.3 m
- 1.5.5 The operational certificate holder must ensure that adequate authorized works to manage stormwater, such that stormwater is infiltrated into the ground with the authorized works, are

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complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.

1.6 **Facility Entrance**

This section applies to the Facility entrance.

- 1.6.1 The authorized works are sign(s), gate, fence, weigh scale, and related appurtenances approximately located as shown on Site Plan A.
- 1.6.2 The operational certificate holder must ensure the authorized works are complete and fully operational on or before the date of issuance of this operational certificate and at all times thereafter.

1.7 **Location of Facility**

This section applies to the location of the Facility.

- 1.7.1 The location of the Facility is PID 001-223-321, LOT A, DISTRICT LOT 85, SAYWARD DISTRICT, PLAN 30709 EXCEPT PART IN PLAN EPP15087, approximately located as shown on Site Plan A.

2. **GENERAL REQUIREMENTS**

2.1 **Glossary**

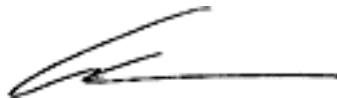
The following capitalized terms referred to in this authorization are defined in the Glossary below. Other terms used in this authorization have the same meaning as those defined in the *Environmental Management Act*, applicable regulations, and the Landfill Criteria;

“Attractant” means food or food waste, compost, carcass or part of an animal, fish, or other meat, or other waste or garbage, that could attract bears, birds, rodents, insects, vectors or wildlife, but does not include grass, leaves, weeds, branches and woodwaste;

“Facility” means the Original Landfill, Original Leachate Management Works, New Landfill, New Leachate Management Works, New Stormwater Management Works and the authorized works in section 1.6.1 (Facility Entrance) of this operational certificate;

“Freeboard” means the difference in elevation between the contained liquid level and the top of the containment works at its lowest point;

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“Landfill Criteria” means the Landfill Criteria for Municipal Solid Waste Second Edition June 2016, as amended or replaced from time to time;

“New Landfill” means the authorized works in section 1.3.4 of this operational certificate;

“New Leachate Management Works” means the authorized works in section 1.4.5 of this operational certificate;

“New Stormwater Management Works” means the authorized works in section 1.5.3 of this operational certificate;

“Original Landfill” means the Original Lined Cell and the Original Un-Lined Cell;

“Original Leachate Management Works” means the authorized works in section 1.2.5 of this operational certificate;

“Original Lined Cell” means the authorized works in section 1.1.5(i) of this operational certificate;

“Original Un-Lined Cell” means the authorized works in section 1.1.5(ii) of this operational certificate;

“Province” means Her Majesty the Queen in right of British Columbia;

“Regulatory Document” means any document that the operational certificate holder is required to cause to be prepared, prepare or submit to the director or the Province, pursuant to: (i) this authorization; (ii) any regulation made under the *Environmental Management Act* that regulates the Facility described in this authorization or the discharge of waste from that Facility; or (iii) any order issued under the *Environmental Management Act* directed against the operational certificate holder that is related to the Facility described in this authorization or the discharge of waste from that Facility;

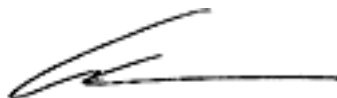
“Significant Works” means the Facility excluding the authorized works in section 1.6.1 (Facility Entrance) of this operational certificate.

2.2 **Use of Qualified Professional(s)**

The operational certificate holder must cause a Qualified Professional to:

- (a) Design and inspect the construction of the Facility, and,
- (b) Certify documents related to the Facility including plans, specifications, drawings, construction

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reports, assessments, reviews, investigations, studies, surveys, programs, reports and as-built record drawings.

(d) Submit a completed Declaration of Competency and a Conflict of Interest Disclosure Statement with each document.

2.3 **Operations and Closure Plan (OCP)**

(a) The operational certificate holder must cause a Qualified Professional to certify and submit an up to date OCP for the Original Landfill and the Original Leachate Management Works, to the director, on or before the earlier of:

- (i) 30 days before the date of commencement of waste discharge to the Original Lined Cell,
- (ii) 30 days after the date of issuance of this operational certificate.

(b) The OCP must comply with the requirements of this operational certificate, include information specified in relevant items listed in the Landfill Criteria Section 10.3 Design, Operations and Closure Plan including a site layout plan, a filling plan, a lifespan analysis table, a stormwater management plan, a leachate management plan, an environmental monitoring plan, an operations plan, a closure plan, and the information specified in the following sections of this operational certificate:

- 2.7(a) (soil acceptance plan), and,
- 2.10(a) (financial security plan).

(c) The operational certificate holder must carry out the most recent OCP and design, construct, operate, inspect, maintain, monitor and close the Original Landfill and the Original Leachate Management Works, in compliance with the most recent OCP and this operational certificate, until the Original Landfill and the Original Leachate Management Works are decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.

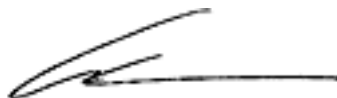
2.4 **Hydrogeology and Hydrology Characterization Report (HHCR)**

(a) The operational certificate holder must cause a Qualified Professional to certify and submit an up to date HHCR, to the director, on or before 90 days before the date of commencement of waste discharge to the New Landfill.

(b) The HHCR must include characterization of the geology, hydrogeology, and surface hydrology at and near the Facility site, and the information specified in all the items listed in the Landfill Criteria, section 10.1 Hydrogeology and Hydrology Characterization Report.

(c) The operational certificate holder must cause a Qualified Professional to certify and submit an updated HHCR to the director, at least once every five years after the date of commencement of waste

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discharge to the New Landfill.

2.5 **Design, Operations and Closure Plan (DOCP)**

(a) The operational certificate holder must cause a Qualified Professional to certify and submit an up to date DOCP, for the Facility, to the director, on or before 90 days before the date of commencement of waste discharge to the New Landfill.

(b) The DOCP must comply with the requirements of this operational certificate, include the information specified in all the items listed in the Landfill Criteria Section 10.3 Design, Operations and Closure Plan, and the information specified in the following sections of this operational certificate:

- 2.6(a) (New Leachate Management Works commissioning plan),
- 2.7(a) (soil acceptance plan),
- 2.8(a) (trigger level assessment plan),
- 2.9(a) (plan to remove all waste from the Original Landfill), and,
- 2.10(b) (financial security plan).

(c) The operational certificate holder must cause a Qualified Professional to certify and submit an updated DOCP to the director, as necessary to keep the DOCP up to date, at least once every five years after the date of commencement of waste discharge to the New Landfill.

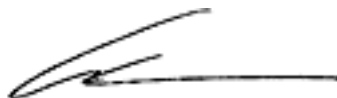
(d) The operational certificate holder must carry out the most recent DOCP and design, construct, operate, inspect, maintain, monitor, and close the Facility, in compliance with most recent DOCP and this operational certificate.

2.6 **New Leachate Management Works Commissioning Plan and Report**

(a) The DOCP submitted pursuant to section 2.5 of this operational certificate must include a New Leachate Management Works commissioning plan that includes:

- (i) the expected duration of the New Leachate Management Works commissioning period,
- (ii) description of the New Leachate Management Works and design, including treatment of leachate from soil and treated leachate infiltration pond design and infiltration tests,
- (iii) the monitoring, sampling and analyses that will be carried out during the New Leachate Management Works commissioning period including the quantity and quality of leachate and treated leachate effluent, and confirmatory sampling before the discharge of any treated leachate effluent to the treated leachate infiltration pond,
- (iv) operating procedures that will be carried out during the New Leachate Management Works commissioning period including review of confirmatory sampling results before the discharge of any treated leachate effluent to the treated leachate infiltration pond,
- (v) contingency measures that will be carried out during the New Leachate Management Works

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commissioning period if the treated leachate effluent quality does not comply with this operational certificate, including storage, retreatment, and transport to an off-site authorized treatment facility,

(vi) New Leachate Management Works commissioning report description, table of contents and summary of contents.

(b) The operational certificate holder must cause a Qualified Professional to certify and submit a New Leachate Management Works commissioning report, that includes the information contemplated in section 2.6(a)(vi) of this operational certificate, to the director, on or before 30 days after the completion of the New Leachate Management Works commissioning period, or as specified by the director.

2.7 **Soil Acceptance Plan**

(a) The OCP submitted pursuant to section 2.3, and the DOCP submitted pursuant to section 2.5, of this operational certificate, must include a soil acceptance plan that includes procedures that will be carried out before soil is accepted at the Facility including receipt and review of documents required by section 2.7(b) of this operational certificate, and consideration of the applicable Original Leachate Management Works or New Leachate Management Works adequacy to treat leachate from the soil.

(b) Before a specific quantity of soil is accepted at the Facility, the operational certificate holder must cause a Qualified Professional to certify and submit to the operational certificate holder, a document pertaining to the specific quantity of soil that includes:

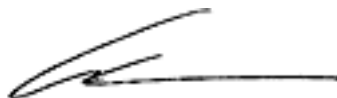
- (i) the soil tonnage(s) and soil quality class(es) as described in the most recent version of Technical Guidance 1 on Contaminated Sites Site Characterization and Confirmation Testing,
- (ii) the soil origin including applicable civic address, site identification number, parcel identifier, parcel identification number, legal description, and,
- (iii) characterization of the soil in accordance with ministry procedures and applicable Contaminated Sites Regulation Guidance, Protocols and Procedures.

2.8 **Trigger Level Assessment Plan**

(a) The DOCP submitted pursuant to section 2.5 of this operational certificate must include a trigger level assessment plan that includes:

- (i) Description of the routine monitoring of the quantity and quality of leachate leakage through the primary liner and into the leak detection layer for the New Landfill, and for the leachate treatment pond(s), and related leachate leakage quantities and qualities that will trigger corresponding described increased monitoring, investigations, contingency measures and actions.
- (ii) Description of the routine monitoring of groundwater quality immediately downgradient of the New Landfill, the leachate treatment pond(s), and the treated leachate infiltration pond, and related groundwater substance concentrations that will trigger corresponding described increased

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monitoring, investigations, contingency measures and actions.

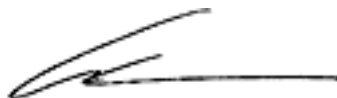
2.9 **Plan to Remove all Waste from the Original Landfill**

- (a) The DOCP submitted pursuant to section 2.5 of this operational certificate must include a plan to remove all waste from the Original Landfill, categorize such waste, discharge all such waste to the New Landfill or to other identified and authorized waste management facility(ies), carry out sampling to confirm all such waste has been removed, and decommission the Original Landfill and the Original Leachate Management Works.
- (b) Subject to section 1.3.2 of this operational certificate, waste removed from the Original Landfill is authorized to be discharged to the New Landfill. The tonnage of such waste must not be included for the purpose of determining compliance with section 1.3.1 of this operational certificate.
- (c) The director may require the operational certificate holder to carry out and complete the plan referred to in section 2.9(a) of this operational certificate, in accordance with the director's requirements.
- (d) If the plan referred to in section 2.9(a) of this operational certificate is carried out, the operational certificate holder must cause a Qualified Professional to certify and submit a report to the director that confirms that the plan has been carried out and completed in accordance with the director's requirements, describes the plan implementation, describes and provides the waste categorization, describes and provides the sampling and results, describes the decommissioning of the Original Landfill and the Original Leachate Management Works, provides photos documenting the implementation of the plan referred to in section 2.9(a) of this operational certificate, and lists the tonnages or volumes, and categories of waste removed and discharged to the New Landfill and to other identified and authorized waste management facility(ies), on or before 60 days after the plan referred to in section 2.9(a) of this operational certificate has been carried out and completed.

2.10 **Financial Security**

- (a) The OCP submitted pursuant to section 2.3 of this operational certificate must include a financial security plan that includes:
 - (i) the calculations of the amounts of financial security and time periods for each phase of development for the Original Landfill in accordance with the Landfill Criteria Section 8.0 Financial Security, and,
 - (ii) the amounts of financial security for the corresponding time periods.
- (b) The DOCP submitted pursuant to section 2.5 of this operational certificate must include a financial security plan that includes:
 - (i) the tasks, estimated costs, contingency costs, calculations of the amounts of financial security

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- and time periods, to carry out and complete the plan referred to in section 2.9(a) of this operational certificate (plan to remove all waste from the Original Landfill),
- (ii) the calculations of the amounts of financial security and time periods for each phase of development for the New Landfill in accordance with the Landfill Criteria Section 8.0 Financial Security, and,
- (iii) the amounts of financial security for the corresponding time periods.

(c) The operational certificate holder must provide the director with financial security, on or before the earlier of:

- (i) 30 days before the date of commencement of waste discharge to the Original Lined Cell,
- (ii) 30 days after the date of issuance of this operational certificate,
- (iii) 90 days before the date of commencement of waste discharge to the New Landfill,

and at all times thereafter.

(d) The amount of financial security at any time must be equal to or greater than:

- (i) Before the report referred to in section 2.9(d) (report that confirms that the plan referred to in section 2.9(a) of this operational certificate has been carried out and completed) of this operational certificate is submitted to the director, the greater amount specified for the corresponding time period in:
 - the financial security plan in the most recent OCP,
 - the financial security plan in the most recent DOCP.
- (ii) On and after the report referred to in section 2.9(d) (report that confirms that the plan referred to in section 2.9(a) of this operational certificate has been carried out and completed) of this operational certificate is submitted to the director, the amount specified for the corresponding time period in the financial security plan in the most recent DOCP.

(e) The form of financial security must be satisfactory to the director.

(f) At the discretion of the director, such financial security may be used among other things:

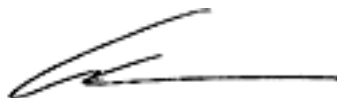
- (i) to correct any inadequacy of the Facility relating to its design, construction, operation, inspection, maintenance, monitoring, closure, and post-closure;
- (ii) to correct any default in compliance with this operational certificate or the *Environmental Management Act*; and,
- (iii) for remediation of the Facility.

(g) The operational certificate holder must replenish any amounts drawn from the posted financial security within 60 days of such amounts being drawn or as otherwise specified by the director.

2.11 **Construction Report(s)**

(a) The operational certificate holder must cause a Qualified Professional to carry out inspections

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before and during the construction or modification of Significant Works, and, after the completion of construction or modification of Significant Works, to certify and submit construction report(s) to the director:

- (i) for construction of the New Landfill and the New Leachate Management Works, on or before 30 days before the date of commencement of waste discharge to those new Significant Works, and,
- (ii) for all Significant Works, on or before 60 days after the completion of construction or modification of the Significant Works.

(b) The construction report(s) must demonstrate that the Significant Works have been constructed in accordance with this operational certificate and the applicable most recent OCP or DOCP, describe any technical concerns that arose from the inspections and testing and how they were addressed, and include as-built record drawings of the constructed Significant Works, all the inspection and testing reports and results including geologic inspection report, quality control and quality assurance testing, soil test data including field and laboratory data, as described in the Landfill Criteria section 10.2 Construction Report(s).

2.12 **Notification of Commencement of Waste Discharge**

The operational certificate holder must notify the director of:

- (a) the date of commencement of waste discharge to the Original Lined Cell, on that date,
- (b) the date of commencement of waste discharge to the New Landfill, on that date,
- (c) the date the Original Lined Cell has reached capacity, on that date, and,
- (d) the date the plan referred to in section 2.9(a) of this operational certificate has been carried out and completed, on that date.

2.13 **Buffer Zone**

The operational certificate holder must ensure that the New Landfill, New Leachate Management Works, and New Stormwater Management Works, are located a minimum of 50 m from the Facility site boundary.

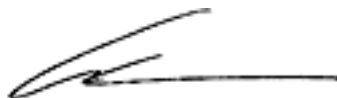
2.14 **Depth to Groundwater**

The operational certificate holder must ensure that the New Landfill secondary base liner, and the New Leachate Management Works leachate treatment pond(s) secondary base liner, are a minimum of 1.5 m above groundwater at all times.

2.15 **Covenant**

On or before the date of commencement of waste discharge to the New Landfill, the operational certificate holder must register a covenant under section 219 (1) of the *Land Title Act*, in a form

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acceptable to the director, that binds successors in title to uphold the continued implementation of the closure plan in the most recent DOCP, and prohibits development of the Facility other than as contemplated by this operational certificate or approved by the director. Such covenant must include an acknowledgement that the property was used for the purpose of waste disposal, must be registered as a charge against title to the property on which the facility is located and must be registered in priority to all charges except charges which do not give the holders any rights which might conflict with the covenant.

2.16 **Additional Requirements**

The director may require the operational certificate holder to:

- (a) Cause a Qualified Professional to certify and submit to the director additional, amended or improved documents of the Facility including plans, specifications, drawings, construction reports, assessments, reviews, investigations, studies, surveys, programs, reports and as-built record drawings.
- (b) Carry out actions in accordance with the additional, amended or improved documents submitted, and additional actions as specified.
- (c) Repair, alter, remove, improve or add to existing facilities and works, or construct new facilities and works, at the Facility.
- (d) Temporarily or permanently cease waste discharge to the Original Lined Cell and/or the New Landfill, cover part(s) or all of the Original Landfill and/or the New Landfill with final cover, and close and decommission the Facility, as specified.

2.17 **Authorization Requirements**

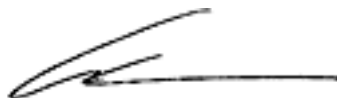
Where this authorization provides that the director may specify a matter or require an action to be carried out, the operational certificate holder must comply with the specification and carry out the action in accordance with the requirements of the director.

3. **OPERATING AND PERFORMANCE REQUIREMENTS**

3.1 **Multiple and/or Spare Works and Auxiliary Power Facilities**

The operational certificate holder must provide and install multiple and/or spare works and auxiliary power facilities to ensure the Original Lined Cell, Original Leachate Management Works, New Landfill, New Leachate Management Works, and New Stormwater Management Works, are complete and fully operational as specified in this operational certificate, including during maintenance, breakdowns and electrical power outages.

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3.2 **Maintenance of the Facility**

- (a) The operational certificate holder must cause persons that are qualified and trained to operate, regularly inspect, and maintain the Facility, in good working order. If components of the Facility have a manufacturer's recommended maintenance schedule, then those components must, at a minimum, be maintained in accordance with that schedule.
- (b) The operational certificate holder must prepare documents of the qualification and training of the persons operating, inspecting and maintaining the Facility, and of Facility inspections, operation and maintenance.

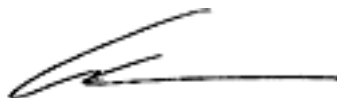
3.3 **Facility Manager and Operator Certification**

- (a) The operational certificate holder must ensure that at least one person responsible for the management of the Facility is certified, and maintains certification, by The Solid Waste Association of North America (SWANA) as a Manager of Landfill Operations, and at least one person responsible for the operation of the Facility has, within the preceding five years, successfully completed the SWANA Landfill Operations Basics course, on or before the earlier of:
- (i) the date of commencement of waste discharge to the Original Lined Cell,
 - (ii) the date of commencement of waste discharge to the New Landfill,
- and at all times thereafter.
- (b) The operational certificate holder must prepare documents of the SWANA certification and training of the person(s) responsible for the management and operation of the Facility.

3.4 **New Leachate Management Works Classification and Operator Certification**

- (a) The operational certificate holder must have the New Leachate Management Works classified by the Environmental Operators Certification Program (EOCP), on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.
- (b) The operational certificate holder must ensure that the person(s) responsible for the operation and maintenance of the New Leachate Management Works is(are) certified at an EOCP certification level equivalent to or higher than the EOCP classification level of the New Leachate Management Works, on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.
- (c) The operational certificate holder must prepare documents of the EOCP classification level of the New Leachate Management Works and the EOCP certification level(s) of the person(s) responsible for the operation and maintenance of the New Leachate Management Works.

Date issued: August 1, 2019



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for Director, *Environmental Management Act*
Authorizations - South Region

3.5 **Groundwater Quality**

(a) The operational certificate holder must ensure that the Facility does not cause the concentration of any substance in groundwater flowing from the Facility site boundary to be greater than:

(i) the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance,

or,

(ii) if the local background concentration of any substance is greater than (i), the local background concentration of that substance.

(b) If section 3.5(a)(ii) of this operational certificate is being used, the operational certificate holder must cause a Qualified Professional to determine the local background concentration of substance(s) in (a), in accordance with the latest approved version of Protocol 9 for Contaminated Sites, Determining Background Groundwater Quality, and include such determination(s) in the Annual Operations and Monitoring Report.

(c) The director may specify more stringent groundwater quality standards than those set out in this section.

3.6 **Landfill Gas Management**

The operational certificate holder must ensure that:

(a) The Facility does not cause:

(i) combustible gas concentrations to exceed the lower explosive limit of methane (5 percent by volume), or a lower concentration specified by the director, in soil at the Facility site boundary;

(ii) combustible gas concentrations to exceed 20 percent of the lower explosive limit of methane (1 percent by volume) in any building; and

(iii) federal, provincial, or local ambient air quality objectives and standards to be exceeded in air at the Facility site boundary.

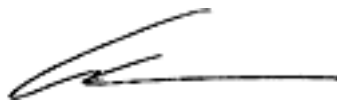
(b) Landfill gas is managed in accordance with all migration and health and safety requirements.

3.7 **Nuisance**

The operational certificate holder must ensure that the Facility does not cause a nuisance including with regard to birds, rodents, insects, odour, noise, dust, litter, vector and wildlife attraction.

3.8 **Complaints**

Date issued: August 1, 2019



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for Director, *Environmental Management Act*
Authorizations - South Region

The operational certificate holder must prepare documents of complaints with regard to matters relevant to this operational certificate, including environmental and nuisance complaints. These documents must include the source and nature of the complaint, actions, responses, and corresponding dates and times.

3.9 **Regulatory Documents**

(a) The operational certificate holder must retain all Regulatory Documents.

(b) The operational certificate holder must retain all Regulatory Documents for the last seven years at the Facility and such documents must be available for immediate inspection at the Facility by a director or an officer.

(c) If requested by a director or an officer, the operational certificate holder must submit the requested Regulatory Documents to the director or officer within 14 days of the request.

4. **SAMPLING REQUIREMENTS**

4.1 **Sampling Procedures**

The operational certificate holder must carry out required sampling in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2013 Edition (Permittee)" or most recent edition, or by alternative procedures as authorized by the director. A copy of the above manual is available on the Ministry web page at <https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance>.

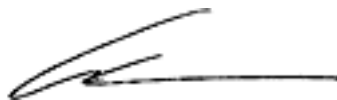
4.2 **Analytical Procedures**

The operational certificate holder must carry out required analyses in accordance with procedures described in the "British Columbia Laboratory Manual (2015 Permittee Edition)", or the most recent edition or by alternative procedures as authorized by the director. A copy of the above manual is available on the Ministry web page at <https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance>.

4.3 **Quality Assurance**

(a) The operational certificate holder must obtain from the analytical laboratory(ies) their precision, accuracy and blank data for each sample set submitted by the operational certificate holder and an evaluation of the data acceptability, based on criteria set by such laboratory.

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Authorizations - South Region

(b) The operational certificate holder must submit samples to analytical laboratory(ies) that meet the definition of a qualified laboratory under the Environmental Data Quality Assurance Regulation.

(c) The operational certificate holder must collect, prepare and submit for analysis by the analytical laboratory(ies) quality control (QC) samples for each parameter. As a minimum,

- (i) The number of QC samples should be 20% of all samples collected (environmental + QC samples) within 48 hours of each other, and
- (ii) Include duplicate, field and trip blank samples for each parameter.

5. **REPORTING REQUIREMENTS**

5.1 **Routine Reporting**

The operational certificate holder must submit all routine Regulatory Documents required by this operational certificate by email to the Ministry's Routine Environmental Reporting Submission Mailbox at EnvAuthorizationsReporting@gov.bc.ca or as otherwise instructed by the director. For guidelines on how to properly name the files and email subject lines or for more information visit the Ministry website <http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/routine-environmental-reporting-submission-mailbox>.

5.2 **Non-compliance Notification**

(a) The operational certificate holder must immediately notify the director or designate by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the director of any non-compliance with the requirements of this authorization by the operational certificate holder and must take remedial action to remedy any effects of such non-compliance.

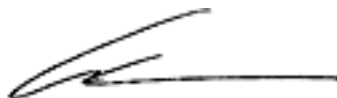
(b) The operational certificate holder must provide the director with written confirmation of all such non-compliance events, including available test results within 24 hours of the original notification by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the director.

5.3. **Non-compliance Reporting**

(a) If the operational certificate holder fails to comply with any of the requirements of this authorization, the operational certificate holder must, within 30 days of such non-compliance, submit to the director a written report that is satisfactory to the director and includes, but is not necessarily limited to, the following:

- (i) all relevant test results obtained by the operational certificate holder related to the non-compliance,

Date issued: August 1, 2019



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for Director, *Environmental Management Act*
Authorizations - South Region

- (ii) an explanation of the most probable cause(s) of the non-compliance, and
- (iii) a description of remedial action planned and/or taken by the operational certificate holder to prevent similar non-compliance(s) in the future.

(b) The operational certificate holder must submit all non-compliance reporting required to be submitted under this section by email to the Ministry's Compliance Reporting Submission Mailbox at EnvironmentalCompliance@gov.bc.ca or as otherwise instructed by the director. For guidelines on how to report a non-compliance or for more information visit the Ministry website <http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/non-compliance-reporting-mailbox>.

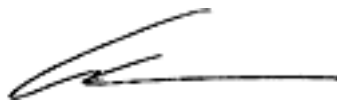
5.4 **Annual Operations and Monitoring Report**

(a) The operational certificate holder must cause a Qualified Professional to certify and submit an Annual Operations and Monitoring Report in a format suitable for public release, for the preceding calendar year, to the director on or before March 31 of each year. On or before March 31 of each year, the operational certificate holder must post a copy of the Annual Operations and Monitoring Report online, on a website accessible to the public, and in accordance with any requirements of the director.

(b) The Annual Operations and Monitoring Report must include the following information:
Operations Report:

- (i) Summary of OCP implementation that addresses the information in section 2.3(b), and summary of DOCP implementation that addresses the information in 2.5(b), of this operational certificate,
- (ii) Summary of construction report(s),
- (iii) Annual and cumulative tonnages and categories of waste including soil tonnage(s) and soil quality class(es) discharged to the Original Lined Cell and to the New Landfill,
- (iv) Remaining volume and life of the Original Lined Cell and of the New Landfill,
- (v) Summary of treated leachate effluent quantity and quality discharged to the treated leachate infiltration pond,
- (vi) Summary of complaints and nuisances and description of remedial action planned and/or taken by the operational certificate holder to prevent similar complaints and nuisances in the future,
- (vii) Summary of non-compliance notifications and non-compliance reporting and description of remedial action planned and/or taken by the operational certificate holder to prevent similar non-compliance(s) in the future ,
- (viii) Annual status form in accordance with the instructions and template at the ministry website <https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/annual-status-form>
- (ix) Summary of OCP and DOCP implementation, and construction of Significant Works, planned for the next calendar year,

Date issued: August 1, 2019



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for Director, *Environmental Management Act*
Authorizations - South Region

Environmental Monitoring Plan Report:

- (x) Site plan(s), sampling locations, stormwater flow paths, groundwater elevations, gradients and flow directions,
- (xi) Sampling facilities, frequencies, substances, sampling and analytical procedures,
- (xii) Data including laboratory analysis and quality assurance and quality control results,
- (xiii) Data tabulation, trend analysis, graphs, diagrams, and interpretation,
- (xiv) Trigger level assessment plan monitoring, data, results and interpretation,
- (xv) Any determination(s) of the local background concentration of substance(s) in accordance with section 3.5 of this operational certificate,
- (xvi) Comparison of the data with the standards for treated leachate effluent discharge, stormwater quality, groundwater quality, and landfill gas management, specified in sections 1.2, 1.4, 1.5, 3.5 and 3.6 of this operational certificate, and identification of any non-compliance and predicted future non-compliance,
- (xvii) Results, conclusions, recommendations and changes to the environmental monitoring plan.

(c) The operational certificate holder must upload monitoring data associated with this operational certificate to the Ministry's Environmental Monitoring System (EMS) database, within 45 days of the end of the 3 month period in which the data is collected.

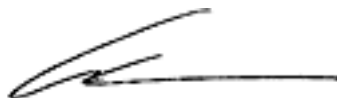
5.5 **Licence to Publish Documents**

(a) Subject to paragraph (b), the operational certificate holder authorizes the Province to publish on the Ministry of Environment and Climate Change Strategy website the entirety of any Regulatory Document.

(b) The Province will not publish any information that could not, if it were subject to a request under section 5 of the *Freedom of Information and Protection of Privacy Act*, be disclosed under that Act.

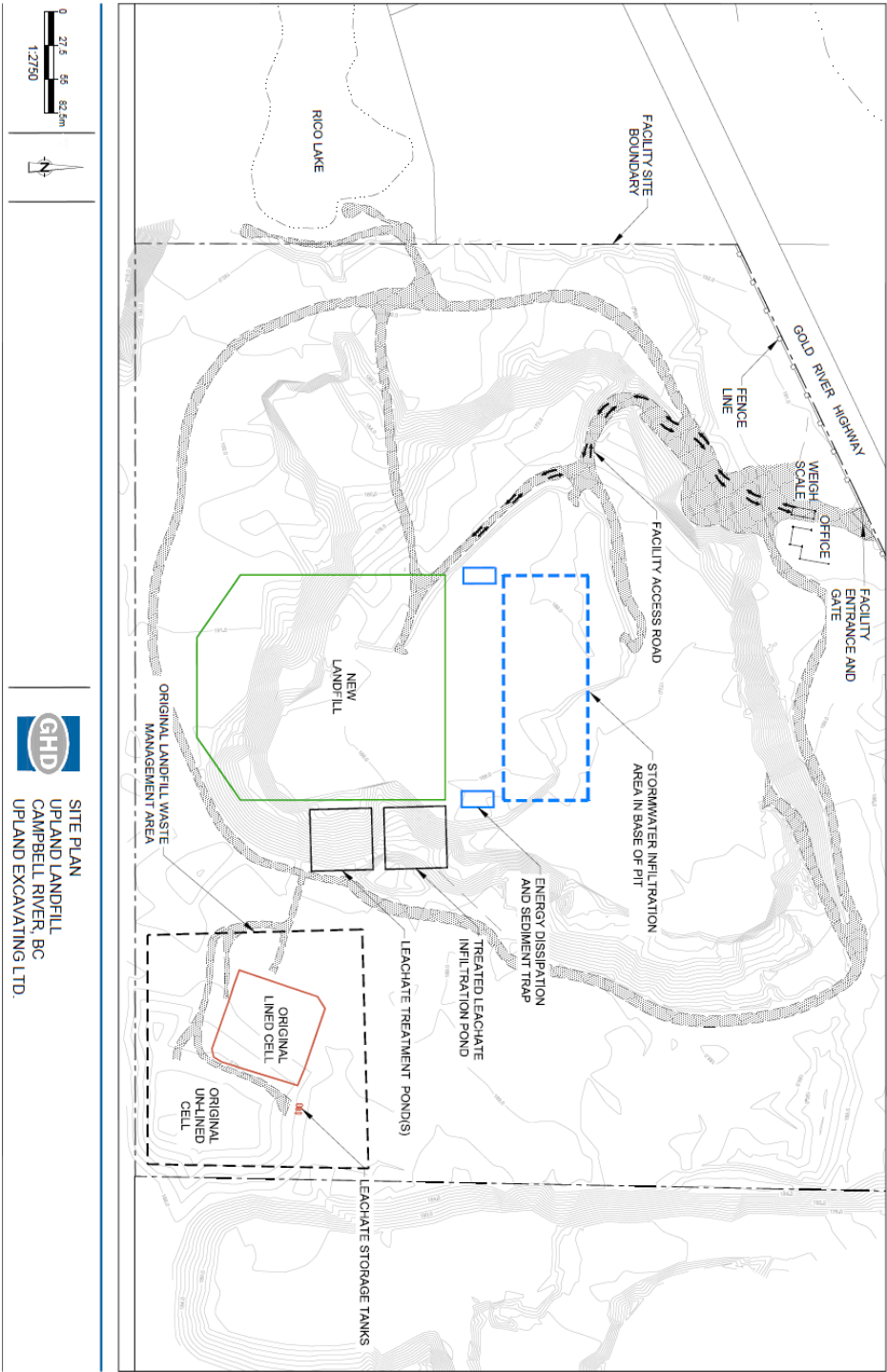
(c) The operational certificate holder will indemnify and save harmless the Province and the Province's employees and agents from any claim for infringement of copyright or other intellectual property rights that the Province or any of the Province's employees or agents may sustain, incur, suffer or be put to at any time that arise from the publication of a Regulatory Document.

Date issued: August 1, 2019



Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

Site Plan A



Date issued: August 1, 2019

Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region



April 26, 2022

Tracking Number: 405141
Authorization Number: 107689

UPLAND EXCAVATING LTD.
#201-909 ISLAND HIGHWAY
CAMPBELL RIVER BC V9W 2C2

Re: Your application dated June 07, 2021, for amendments to Operational Certificate 107689, under the *Environmental Management Act*

In response to the subject application, and pursuant to Section 16 of the *Environmental Management Act*, Operational Certificate 107689 is hereby amended as follows:

The subject part of the preamble page 1 is amended from:

Is authorized to manage waste at the Facility located in Campbell River, British Columbia, subject to the requirements listed below. Contravention of any of these requirements is a violation of the *Environmental Management Act* and may lead to prosecution.

to:

Is authorized to manage waste at the Facility located in Campbell River, British Columbia, provided that the operational certificate holder complies with all provisions of this operational certificate. Unless a contrary intention appears, the provisions of this operational certificate are requirements that must be complied with regardless of whether the operational certificate holder introduces waste to the environment. Contravention of any of these requirements, and any discharge of waste while out of compliance with any provisions of this operational certificate, is a violation of the *Environmental Management Act*, and may lead to prosecution.

Sub-section 1.3.2 (d) is amended to:

(d) soil that is not hazardous waste,

Sub-section 1.4.5 is amended after “leachate treatment pond(s)” by adding:
treated leachate holding pond or tank,

Sub-section 1.4.6 is amended after “ 1×10^{-7} cm/s.” by adding:

The treated leachate holding pond must include from bottom to top a secondary base liner, leak detection drainage layer and leak collection pipe(s), and a primary base liner. The treated leachate holding pond secondary base liner and the primary base liner must each include a coated woven polyethylene geomembrane of minimum 0.75 mm thickness.

Sub-section 1.4.7 is amended after “treated leachate infiltration pond: 0.6 m” by adding:
treated leachate holding pond: 0.6 m.

4. Sub-sections 2.9(c) and 2.9(d) are amended to:

(c) The operational certificate holder must carry out and complete the plan referred to in section 2.9(a) of this operational certificate, on or before one year after the date of this letter.

(d) The operational certificate holder must cause a Qualified Professional to certify and submit a report to the director that confirms that the plan referred to in section 2.9(a) of this operational certificate has been carried out and completed, describes the plan implementation, describes and provides the waste categorization, describes and provides the sampling and results, describes the decommissioning of the Original Landfill and the Original Leachate Management Works, provides photos documenting the implementation of the plan referred to in section 2.9(a) of this operational certificate, and lists the tonnages or volumes, and categories of waste removed and discharged to the New Landfill and to other identified and authorized waste management facility(ies), on or before 60 days after the plan referred to in section 2.9(a) of this operational certificate has been carried out and completed.

5. Site Plan A is amended to the enclosed Site Plan A.

All other terms and conditions of the operational certificate remain in full force and effect.

Please note that although a revised operational certificate document has not been produced at this time a copy of this letter is being placed on the operational certificate file, as an addendum to the operational certificate, to formally reflect the change.

This operational certificate does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the operational certificate holder. This operational certificate is issued pursuant to the provisions of the *Environmental Management Act* to ensure compliance with Section 120(3) of that statute, which makes it an offence to discharge waste, from a prescribed industry or activity, without proper authorization. It is also the responsibility of the operational certificate holder to ensure that all activities conducted under this operational certificate are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

Administration of this operational certificate will be carried out by staff from the Environmental Protection Division's Regional Operations Branch. For guidance regarding how to comply with a waste discharge authorization including submitting reports and reporting non-compliance, please refer to the ministry website at: <https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/comply>, or as further instructed.

For more information about how the Ministry will assess compliance with your operational certificate please refer to gov.bc.ca/environmentalcompliance.

For more information about how to make changes to your operational certificate and to access waste discharge amendment forms and guidance, please refer to gov.bc.ca/wastedischarge-authorizations.

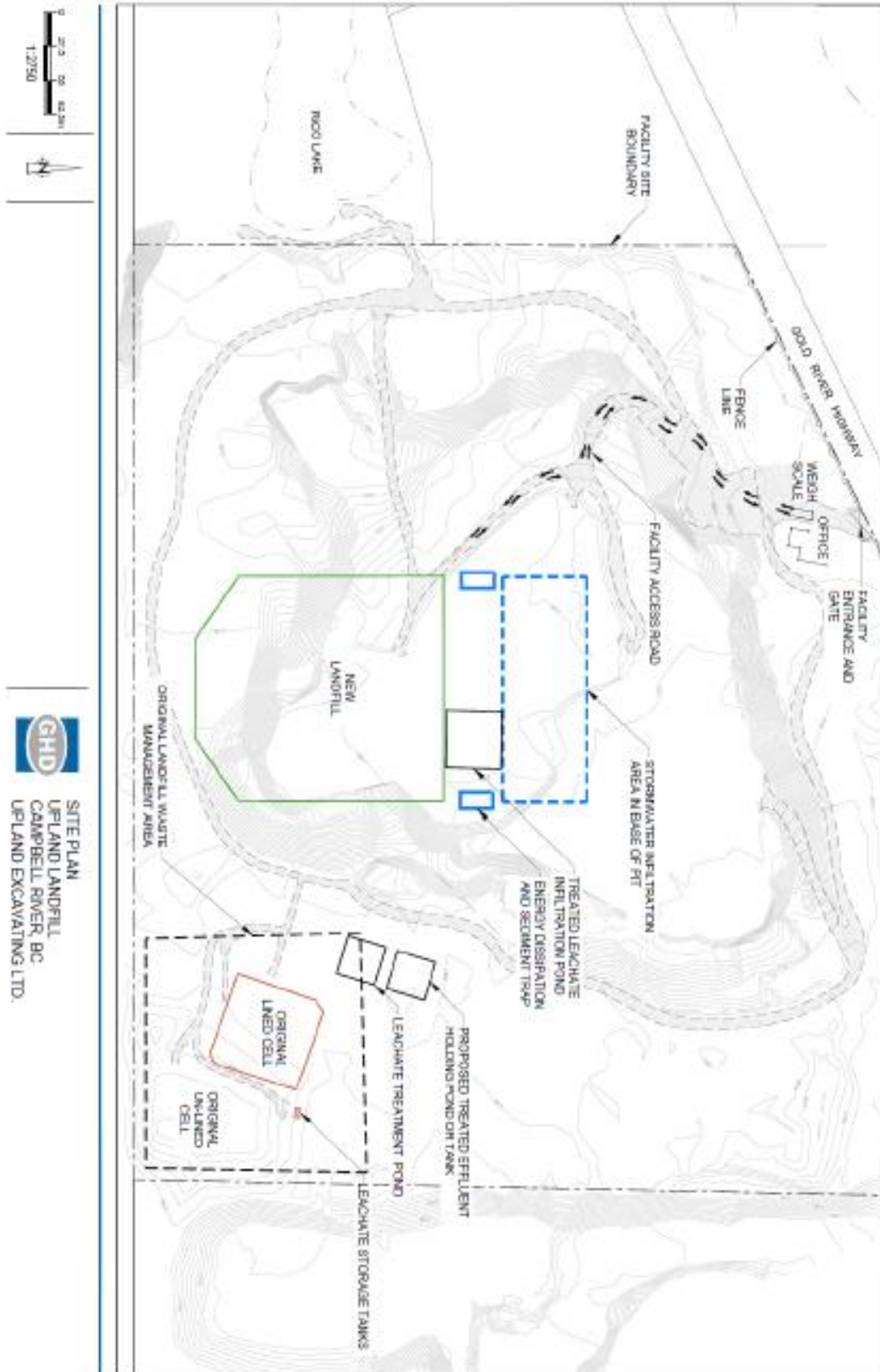
Sincerely,

A handwritten signature in black ink, appearing to read 'Carol Danyluk', written in a cursive style.

Carol Danyluk, P.Eng.
Director's Designate
Environmental Management Act

ENCL: None

Site Plan A



SITE PLAN
UPLAND LANDFILL
CAMPBELL RIVER, BC
UPLAND EXCAVATING LTD.

Appendix B

Original Landfill Environmental Monitoring Plan

**2021/2022 Environmental Monitoring Program Specification
Monitoring Schedule Rationale
Original Landfill
Upland Excavating, Campbell River, BC**

Sampling Location	Purpose	Sample Matrix	Hydraulic Monitoring	June	Nov
Groundwater Monitoring Program (17 locations)					
MW2-14	To characterize groundwater quality upgradient of the Original Landfill.	WG	√	√	√
MW2A-16	To characterize groundwater quality upgradient of the Original Landfill.	WG	√	√	√
MW3-14	To characterize groundwater quality upgradient of the Original Landfill.	WG	√	√	√
MW10-17	To characterize groundwater quality cross-gradient of the Original Landfill and monitor for potential Landfill derived impacts to the underlying aquifer.	WG	√	√	√
MW11-19	To characterize groundwater quality downgradient of the Original Landfill and monitor compliance with respect to water quality.	WG	√	√	√
MW1-14, MW4A-15, MW4B-15, MW5A-15, MW5B-15, MW6-17, MW7-17, MW8-17, MW9-17, MW15A-18, MW15B-18, PZ1-19.		WG	√	-	-
Surface Water Monitoring Program (2 locations)					
Rico Gauge	To monitor the water level in Rico Lake via surface water gauge.	WS	√	-	-
Mclvor Lake	To monitor the water level in Mclvor Lake via BC Hydro Data Records - use link below.	WS	√	-	-
Leak Detection Layer Monitoring Program (1 location)					
S01-17	Leak Detection Layer	W	√	√	√
Leachate Monitoring Program (2 locations)					
S03-19	Leachate Sump	WL	√	√	√
S05-19	Leachate Access Pipe	WL	√	√	√
Field Quality Assurance/Quality Control (QA/QC)¹					
Field Blank		WG	-	√	-
Trip Blank		W	-	-	√
Groundwater Duplicate		WG	-	-	√
Leachate Duplicate		WL	-	√	-

Notes:

¹ - The number of QC samples should be 20% of all samples collected within 48 hours of each other; and include duplicate, field blank, and trip blank samples for each parameter.

S02-17 - Decommissioned

Ladore Dam: https://www.bchydro.com/energy-in-bc/operations/transmission-reservoir-data/previous-reservoir-elevations/vancouver_island/ladore_ldr.html

Environmental Monitoring Program Specification - 2022
Analytical Parameters - Groundwater
Original Landfill
Upland Excavating, Campbell River, BC

Groundwater (WG)	Semi-annual	
	June	November
Water Level Monitoring		
Depth to Water	√	√
Depth to Bottom	√	√
Field Parameters		
Conductivity (uS/cm)	√	√
Oxidation reduction potential (mV)	√	√
pH (s.u.)	√	√
Temperature (deg C)	√	√
Total dissolved solids (mg/L)	√	√
Turbidity (ntu)	√	√
General Chemistry		
Dissolved Hardness (as CaCO ₃)	√	√
Conductivity	√	√
Chloride	√	√
Sulphate	√	√
Sulphide (Low Level) + H ₂ S Calc	√	√
Sulphide, Un-ionized (as H ₂ S) (Calc)	√	√
Total Dissolved Solids (TDS)	√	√
Nutrients		
Alkalinity (Speciated)	√	√
Ammonia Nitrogen	√	√
Nitrate (as N)	√	√
Nitrite (as N)	√	√
Nitrite/Nitrate (Calc)	√	√
Orthophosphate	√	√
Dissolved CSR Metals (incl. Hg)	√	√

Environmental Monitoring Program Specification - 2022
Analytical Parameters - Leachate Leak Detection Layer
Original Landfill
Upland Excavating, Campbell River, BC

Leak Detection Layer Water (W) & Leachate (WL)	Semi-annual	
	June	November
Water Level Monitoring		
Depth to Water	√	√
Depth to Bottom	√	√
Field Parameters		
Conductivity (uS/cm)	√	√
Oxidation reduction potential (mV)	√	√
pH (s.u.)	√	√
Temperature (deg C)	√	√
Total dissolved solids (mg/L)	√	√
Turbidity (ntu)	√	√
General Chemistry		
Dissolved Hardness (as CaCO ₃)	√	√
Conductivity	√	√
Chloride	√	√
Sulphate	√	√
Biological Oxygen Demand (BOD)	√	√
Chemical Oxygen Demand (COD)	√	√
Sulphide (Low Level) + H ₂ S Calc	√	√
Sulphide, Un-ionized (as H ₂ S) (Calc)	√	√
Total Dissolved Solids (TDS)	√	√
Total Suspended Solids (TSS)	√	√
Nutrients		
Alkalinity (Speciated)	√	√
Ammonia Nitrogen	√	√
Nitrate (as N)	√	√
Nitrite (as N)	√	√
Nitrite/Nitrate	√	√
Orthophosphate	√	√
Metals		
Dissolved CSR Metals (incl. Hg)	√	√
Total CSR Metals (incl. Hg)	√	√
Other		
PAHs	√	√
BTEX/VPH	√	√

2022 Environmental Monitoring Program Specification

PROJECT: New Landfill EMP

CLIENT: Northwin Environmental

PROJECT NO.: 11222680 – 15

PROJECT MANAGER: Rose Marie Rocca

MONITORING STAFF:	Kathleen Hasler Carny Wong Airesse MacPhee Tristan Haddas	RESPONSIBILITY	Field Lead Field Technician Project Chemist Database Analyst

LABORATORIES USED: BV Labs, Burnaby, British Columbia

AUTHORIZATION:	MONITORING EVENT(S)	PC/PM SIGNATURE
	March/April, June, August/September, November	_____

Revision #	Date	Revision	GHD
1	January 2022	Specification was developed based on the DOCP, dated July 8, 2021	RMR
2	April 2022	Typo in 2022 EMP Spec was corrected, from MW12-17 to MW11-19.	RMR
3	August 2022	MW3-14 was added to the groundwater monitoring program as a downgradient compliance well, to be sampled semi-annually in 2022. This well was sampled in June 2022, as part of the original EMP, the analytical results will be for the New Landfill EMP as well. In 2023, this well will be sampled quarterly.	RMR
4	August 2022	MW12-22 was added to the groundwater monitoring specification as a downgradient compliance well following its instillation, to be sampled quarterly. Renamed LS1 to LDMP-1 and renamed LS2 to LDMP-2. Added LDS, LDMP-3 and LDMP-4. These changes were made to the leak detection monitoring program to account for as built conditions. Added phenols to the leachate analytical parameter list, to be analyzed annually due to presence of wood waste.	RMR
5	September 2022	Updated QAQC Samples. Added LW-PFAS to field blank's analytical list in Q4.	KH

Monitoring Schedule:	Table 1
Groundwater Analytical Parameters:	Table 2
Surface Water Analytical Parameters:	Table 3
Leachate Analytical Parameters	Table 4
Notes	Page 7

Note for Staff – Labelling error on casing:

LFG1-22 labelled as “SVP1-22” on casing.
LFG2-22 labelled as “SVP2-22” on casing.



Table 1

2022 Environmental Monitoring Program Specification
Monitoring Schedule
New Landfill
Northwin Environmental Campbell River, BC

Sampling Location	Purpose	Sample Matrix	Quarterly Hydraulic Monitoring	March/April	June	August/September	November
Groundwater Monitoring (12 Locations)							
Upgradient Monitoring Wells (5 Locations)							
MW6-17	To monitor upgradient groundwater quality	WG	√	√	√	√	√
MW9-17	To monitor upgradient groundwater quality	WG	√	√	√	√	√
MW1-14	To monitor upgradient groundwater quality	WG	√	√	√	√	√
MW4A-15	To monitor upgradient groundwater quality	WG	√	√	√	√	√
MW4B-15	To monitor upgradient groundwater quality	WG	√	√	√	√	√
Cross-Gradient Monitoring Wells (2 Locations)							
MW2-14	To monitor cross-gradient groundwater quality	WG	√	√	√	√	√
MW2A-16	To monitor cross-gradient groundwater quality	WG	√	√	√	√	√
Downgradient Compliance Monitoring Wells (4 Locations, 1 Proposed Location)							
MW10-17	To monitor downgradient groundwater quality near the east property boundary	WG	√	√	√	√	√
MW12-22	To monitor downgradient groundwater quality at the south property boundary	WG	√	√	√	√	√
MW11-19	To monitor downgradient groundwater quality at the south east corner of the site	WG	√	√	√	√	√
MW3-14	To monitor groundwater quality immediately downgradient of Phase 1 East Landfill Cell.	WG	√	-	√	-	√
MW13 (proposed)	To monitor groundwater quality immediately downgradient of the landfill. Sample once installed	WG	√	√	√	√	√
Surface Water Monitoring (6 Monitoring Locations, 4 Sampling Locations)							
Rico Gauge	To monitor the water level in Rico Lake via surface water gauge.	n/a	√	-	-	-	-
SW15-02	To monitor surface water quality in Rico Lake	WS	-	-	-	-	√
Mclvor Lake	To monitor the water level in Mclvor Lake via BC Hydro Data Records - use link in notes below. Look up and record on day of monitoring event - data is only available for a limited period on BC Hydro website	n/a	√	-	-	-	-
SW15-01	To monitor surface water quality in Mclvor Lake	WS	-	-	-	-	√
East Surface Water Ditch ¹	To monitor surface water quality in the perimeter ditches when water is present and flowing.	WS	-	√	√	√	√
West Surface Water Ditch ¹	To monitor surface water quality in the perimeter ditches when water is present and flowing.	WS	-	√	√	√	√
Leachate Monitoring (2 Locations)							
S06-21	To characterize leachate quality collected from the Leachate Sump at northeast end of Landfill. Sampling location is from the leachate collection system sump riser pipe.	WL	n/a	√	√	√	√
TLIP ²	To assess leachate treatment performance and determine if changes to the treatment process are required. Only collect sample if Upland is currently discharging treated leachate into pond. Sampling location is the end of the leachate discharge pipe. Confirm with Upland if treated leachate effluent can be forced to discharge.	WL	n/a	√	√	√	√
Leak Detection Monitoring Program (5 Locations)							
LDS	To monitor leakage at the primary liner of the landfill as part of the Trigger Level Response Plan. If water is present, collect a sample. Access to the leak detection sump is on the north side of the landfill.	W	√	√	√	√	√
LDM-1	To monitor leakage at the primary liner of the landfill, as part of the Trigger Level Response Plan. Access to the Leak Detection Monitoring Pipe is on the north side of the landfill.	W	√	-	-	-	-
LDM-2	To monitor leakage at the primary liner of the landfill, as part of the Trigger Level Response Plan. Access to the Leak Detection Monitoring Pipe is on the north side of the landfill.	W	√	-	-	-	-
LDM-3	To monitor leakage at the primary liner of the landfill, as part of the Trigger Level Response Plan. Access to the Leak Detection Monitoring Pipe is on the east side of the landfill.	W	√	-	-	-	-
LDM-4	To monitor leakage at the primary liner of the landfill, as part of the Trigger Level Response Plan. Access to the Leak Detection Monitoring Pipe is on the east side of the landfill.	W	√	-	-	-	-
Landfill Gas in Soil Monitoring (2 Locations)							
LFG1-22	To monitor landfill gas migration.	n/a	√ ⁴	-	-	-	√
LFG2-22	To monitor landfill gas migration.	n/a	√ ⁴	-	-	-	√
Field Quality Assurance/Quality Control (QA/QC)³							
Field Blank		WG	-	√	√	√	-
Field Blank for Leachate - PFAS Only		WG	-	-	-	-	√
Trip Blank - BTX/VPH Only		WL/W	-	-	-	-	√
Groundwater Duplicate		WG	-	√	√	√	√
Leachate Duplicate		WL	-	√	√	√	-

Notes:

¹ - Surface water should be sampled in the perimeter ditches only if water is present and flowing. Stagnant water should not be sampled.

² - Treated Leachate Infiltration Pond (TLIP). Only collect a sample if Upland is currently discharging treated leachate into the pond. Sample collection point is the end of the treated leachate discharge pipe/hose. Do not collect stagnant leachate from the pond. Confirm with Upland if treated leachate effluent can be forced to discharge.

³ - The number of QC samples should be 20% of all samples collected within 48 hours of each other; and include duplicate, field blank, and trip blank samples for each parameter. Add QA/QC samples to the November event if 20% has not been reached.

⁴ - Collect water level only if screen is blocked

Mclvor Lake water level. Look up current water level at the Ladore Dam: https://www.bchydro.com/energy-in-bc/operations/transmission-reservoir-data/previous-reservoir-elevations/vancouver_island/ladore_ldr.html

2022 Environmental Monitoring Program Specification
Groundwater Analytical Parameters
New Landfill
Northwin Environmental, Campbell River, BC

Groundwater (WG)	Quarterly			
	March/April	June	August/September	November
Water Level Monitoring				
Depth to Water	√	√	√	√
Depth to Bottom	√	√	√	√
Field Parameters				
Conductivity (uS/cm)	√	√	√	√
Oxidation reduction potential (mV)	√	√	√	√
pH (s.u.)	√	√	√	√
Temperature (deg C)	√	√	√	√
Total dissolved solids (mg/L)	√	√	√	√
Turbidity (ntu)	√	√	√	√
General Chemistry				
Dissolved Hardness (as CaCO ₃)	√	√	√	√
Conductivity	√	√	√	√
Chloride	√	√	√	√
Sulphate	√	√	√	√
Sulphide, Un-ionized (as H ₂ S), total (as H ₂ S)	√	√	√	√
Total Dissolved Solids (TDS)	√	√	√	√
Nutrients				
Alkalinity (Speciated)	√	√	√	√
Total Ammonia Nitrogen	√	√	√	√
Nitrate (as N)	√	√	√	√
Nitrite (as N)	√	√	√	√
Nitrite/Nitrate (Calc)	√	√	√	√
Orthophosphate	√	√	√	√
LEPH/HEPH (includes PAH/EPH)	√	√	√	√
Dissolved CSR Metals (incl. Hg)	√	√	√	√

Table 3

**2022 Environmental Monitoring Program Specification
Surface Water Analytical Parameters
New Landfill
Northwin Environmental, Campbell River, BC**

Surface Water (WS)	Quarterly			
	March/April	June	August/September	November
Water Level Monitoring				
Water level at Rico Gauge	√	√	√	√
Record water level using BC Hydro Data Records - use link in Table 1.	√	√	√	√
Field Parameters				
Conductivity (uS/cm)	√	√	√	√
Oxidation reduction potential (mV)	√	√	√	√
pH (s.u.)	√	√	√	√
Temperature (deg C)	√	√	√	√
Total dissolved solids (mg/L)	√	√	√	√
Turbidity (ntu)	√	√	√	√
General Chemistry				
Dissolved Hardness (as CaCO ₃)	√	√	√	√
Conductivity	√	√	√	√
Chloride	√	√	√	√
Sulphate	√	√	√	√
Sulphide, Un-ionized total (as H ₂ S)	√	√	√	√
Total Suspended Solids (TSS)	√	√	√	√
Nutrients				
Alkalinity (Speciated)	√	√	√	√
Total Ammonia Nitrogen	√	√	√	√
Nitrate (as N)	√	√	√	√
Nitrite (as N)	√	√	√	√
Nitrite/Nitrate (Calc)	√	√	√	√
Orthophosphate	√	√	√	√
LEPH/HEPH (includes PAH/EPH)¹	-	-	-	-
Total CSR Metals (incl. Hg)	√	√	√	√

1- If leachate concentrations for LEPH/HEPH are 80% within CSR 3.2 Aquatic Life Criteria, include LEPH/HEPH analysis in surface water during the next event

Table 4

2022 Environmental Monitoring Program Specification
Leachate Analytical Parameters
New Landfill
Northwin Environmental, Campbell River, BC

Leachate (WL)	Quarterly			
	March/April	June	August/September	November
Water Level Monitoring				
Depth to Water	√	√	√	√
Depth to Bottom	√	√	√	√
Field Parameters				
Conductivity (uS/cm)	√	√	√	√
Oxidation reduction potential (mV)	√	√	√	√
pH (s.u.)	√	√	√	√
Temperature (deg C)	√	√	√	√
Total dissolved solids (mg/L)	√	√	√	√
Turbidity (ntu)	√	√	√	√
General Chemistry				
Dissolved Hardness (as CaCO ₃)	√	√	√	√
Conductivity	√	√	√	√
Chloride	√	√	√	√
Sulphate	√	√	√	√
Sulphide, Un-ionized (as H ₂ S), total (as H ₂ S)	√	√	√	√
Total Biological Oxygen Demand (BOD5)	√	√	√	√
Chemical Oxygen Demand (COD)	√	√	√	√
Total Dissolved Solids (TDS)	√	√	√	√
Total Suspended Solids (TSS)	√	√	√	√
Nutrients				
Alkalinity (Speciated)	√	√	√	√
Total Ammonia Nitrogen	√	√	√	√
Nitrate (as N)	√	√	√	√
Nitrite (as N)	√	√	√	√
Nitrite/Nitrate	√	√	√	√
Orthophosphate	√	√	√	√
LEPH/HEPH (includes PAH/EPH)	√	√	√	√
Total CSR Metals (incl. Hg)	√	√	√	√
Other				
PFOS, PFOA, PFBS	-	-	-	√
BTEX/VPH	-	-	-	√
Phenols	-	-	-	√

**2022 Environmental Monitoring Program Specification
Leak Detection Water Analytical Parameters
New Landfill
Northwin Environmental, Campbell River, BC**

Leak Detection Water (W)	Quarterly			
	March/April	June	August/September	November
Water Level Monitoring				
Depth to Water	√	√	√	√
Depth to Bottom	√	√	√	√
Field Parameters				
Conductivity (uS/cm)	√	√	√	√
Oxidation reduction potential (mV)	√	√	√	√
pH (s.u.)	√	√	√	√
Temperature (deg C)	√	√	√	√
Total dissolved solids (mg/L)	√	√	√	√
Turbidity (ntu)	√	√	√	√
General Chemistry				
Dissolved Hardness (as CaCO ₃)	√	√	√	√
Conductivity	√	√	√	√
Chloride	√	√	√	√
Sulphate	√	√	√	√
Sulphide, Un-ionized (as H ₂ S), total (as H ₂ S)	√	√	√	√
Biological Oxygen Demand (BOD)	√	√	√	√
Chemical Oxygen Demand (COD)	√	√	√	√
Total Dissolved Solids (TDS)	√	√	√	√
Total Suspended Solids (TSS)	√	√	√	√
Nutrients				
Alkalinity (Speciated)	√	√	√	√
Total Ammonia Nitrogen	√	√	√	√
Nitrate (as N)	√	√	√	√
Nitrite (as N)	√	√	√	√
Nitrite/Nitrate	√	√	√	√
Orthophosphate	√	√	√	√
LEPH/HEPH (includes PAH/EPH)	√	√	√	√
Total CSR Metals (incl. Hg)	√	√	√	√
Other				
PFOS, PFOA, PFBS	-	-	-	√
BTEX/VPH	-	-	-	√
Phenols	-	-	-	√

Appendix C

Field Sample Keys and Laboratory Reports

CERTIFICATE OF ANALYSIS

Work Order : **VA22A6872**
Client : **Northwin Environmental Ltd.**
Contact : Mr Brian Fagan
Address : 315 - 1434 Ironwood Street
 Campbell River BC Canada V9W 5T5
Telephone : ----
Project : ----
PO : ----
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : VA2022NTHW1000001
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 6
Laboratory : Vancouver - Environmental
Account Manager : Sneha Sansare
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 01-Apr-2022 22:00
Date Analysis Commenced : 02-Apr-2022
Issue Date : 05-Apr-2022 16:34

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia



General Comments

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

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

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

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

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

Unit	Description
-	No Unit
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

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

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

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



Analytical Results

Sub-Matrix: Water					Client sample ID	New Landfill	----	----	----	----
(Matrix: Water)						Recirc 13/01/22				
Client sampling date / time					29-Mar-2022 04:30					
Analyte	CAS Number	Method	LOR	Unit	VA22A6872-001	-----	-----	-----	-----	-----
					Result	----	----	----	----	----
Anions and Nutrients										
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	681	----	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.197	----	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00249	----	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00358	----	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0613	----	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	----	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	----	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	2.06	----	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.000345	----	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	247	----	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000047	----	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	0.00274	----	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00896	----	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.0406	----	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.184	----	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000653	----	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0068	----	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	12.7	----	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	1.78	----	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00351	----	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00901	----	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.129	----	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	17.7	----	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0118	----	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000257	----	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.70	----	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	----	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	69.8	----	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.826	----	----	----	----	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	New Landfill Recirc 13/01/22	----	----	----	----
Client sampling date / time					29-Mar-2022 04:30	----	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22A6872-001	-----	-----	-----	-----	
					Result	----	----	----	----	
Dissolved Metals										
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	228	----	----	----	----	
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	----	----	----	----	
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000028	----	----	----	----	
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	----	----	----	----	
tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00110	----	----	----	----	
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00087	----	----	----	----	
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	----	----	----	----	
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000394	----	----	----	----	
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00107	----	----	----	----	
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.194	----	----	----	----	
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	----	----	----	----	
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----	
Volatile Organic Compounds										
chlorobenzene	108-90-7	E611C	0.50	µg/L	<0.50	----	----	----	----	
chloromethane	74-87-3	E611C	5.0	µg/L	<5.0	----	----	----	----	
dichlorobenzene, 1,2-	95-50-1	E611C	0.50	µg/L	<0.50	----	----	----	----	
dichlorobenzene, 1,3-	541-73-1	E611C	0.50	µg/L	<0.50	----	----	----	----	
dichlorobenzene, 1,4-	106-46-7	E611C	0.50	µg/L	<0.50	----	----	----	----	
dichloropropane, 1,2-	78-87-5	E611C	0.50	µg/L	<0.50	----	----	----	----	
dichloropropylene, cis+trans-1,3-	542-75-6	E611C	0.75	µg/L	<0.75	----	----	----	----	
dichloropropylene, cis-1,3-	10061-01-5	E611C	0.50	µg/L	<0.50	----	----	----	----	
tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.50	µg/L	<0.50	----	----	----	----	
tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.20	µg/L	<0.20	----	----	----	----	
trichloroethane, 1,1,2-	79-00-5	E611C	0.50	µg/L	<0.50	----	----	----	----	
trichlorofluoromethane	75-69-4	E611C	0.50	µg/L	<0.50	----	----	----	----	
Volatile Organic Compounds [Drycleaning]										
carbon tetrachloride	56-23-5	E611C	0.50	µg/L	<0.50	----	----	----	----	
chloroethane	75-00-3	E611C	0.50	µg/L	<0.50	----	----	----	----	
dichloroethane, 1,1-	75-34-3	E611C	0.50	µg/L	<0.50	----	----	----	----	
dichloroethane, 1,2-	107-06-2	E611C	0.50	µg/L	<0.50	----	----	----	----	
dichloroethylene, 1,1-	75-35-4	E611C	0.50	µg/L	<0.50	----	----	----	----	

Sub-Matrix: Water					Client sample ID	New Landfill	----	----	----	----
(Matrix: Water)						Recirc 13/01/22				
					Client sampling date / time	29-Mar-2022 04:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A6872-001	-----	-----	-----	-----	
					Result	----	----	----	----	
Volatile Organic Compounds [Drycleaning]										
dichloroethylene, cis-1,2-	156-59-2	E611C	0.50	µg/L	<0.50	----	----	----	----	
dichloroethylene, trans-1,2-	156-60-5	E611C	0.50	µg/L	<0.50	----	----	----	----	
dichloromethane	75-09-2	E611C	1.0	µg/L	<1.0	----	----	----	----	
dichloropropylene, trans-1,3-	10061-02-6	E611C	0.50	µg/L	<0.50	----	----	----	----	
tetrachloroethylene	127-18-4	E611C	0.50	µg/L	<0.50	----	----	----	----	
trichloroethane, 1,1,1-	71-55-6	E611C	0.50	µg/L	<0.50	----	----	----	----	
trichloroethylene	79-01-6	E611C	0.50	µg/L	<0.50	----	----	----	----	
vinyl chloride	75-01-4	E611C	0.40	µg/L	<0.40	----	----	----	----	
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611C	0.50	µg/L	<0.50	----	----	----	----	
ethylbenzene	100-41-4	E611C	0.50	µg/L	<0.50	----	----	----	----	
methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.50	µg/L	<0.50	----	----	----	----	
styrene	100-42-5	E611C	0.50	µg/L	<0.50	----	----	----	----	
toluene	108-88-3	E611C	0.40	µg/L	<0.40	----	----	----	----	
xylene, m+p-	179601-23-1	E611C	0.40	µg/L	<0.40	----	----	----	----	
xylene, o-	95-47-6	E611C	0.30	µg/L	<0.30	----	----	----	----	
xylenes, total	1330-20-7	E611C	0.50	µg/L	<0.50	----	----	----	----	
Volatile Organic Compounds [THMs]										
bromodichloromethane	75-27-4	E611C	0.50	µg/L	<0.50	----	----	----	----	
bromoform	75-25-2	E611C	0.50	µg/L	<0.50	----	----	----	----	
chloroform	67-66-3	E611C	0.50	µg/L	<0.50	----	----	----	----	
dibromochloromethane	124-48-1	E611C	0.50	µg/L	<0.50	----	----	----	----	
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611C	1.0	%	89.4	----	----	----	----	
difluorobenzene, 1,4-	540-36-3	E611C	1.0	%	101	----	----	----	----	
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L	<250	----	----	----	----	
EPH (C19-C32)	----	E601A	250	µg/L	<250	----	----	----	----	
HEPHw	----	EC600A	250	µg/L	<250	----	----	----	----	
LEPHw	----	EC600A	250	µg/L	<250	----	----	----	----	
Hydrocarbons Surrogates										



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	New Landfill Recirc 13/01/22	----	----	----	----
Client sampling date / time					29-Mar-2022 04:30	----	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A6872-001	Result	----	----	----	----
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%	103	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L	0.075	----	----	----	----	----
acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	----	----	----	----	----
acridine	260-94-6	E641A	0.010	µg/L	0.033	----	----	----	----	----
anthracene	120-12-7	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	----	----	----	----	----
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	----	----	----	----	----
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L	<0.010	----	----	----	----	----
chrysene	218-01-9	E641A	0.010	µg/L	<0.010	----	----	----	----	----
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L	<0.0050	----	----	----	----	----
fluoranthene	206-44-0	E641A	0.010	µg/L	0.036	----	----	----	----	----
fluorene	86-73-7	E641A	0.010	µg/L	0.020	----	----	----	----	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L	<0.010	----	----	----	----	----
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L	0.025	----	----	----	----	----
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L	0.019	----	----	----	----	----
naphthalene	91-20-3	E641A	0.050	µg/L	<0.050	----	----	----	----	----
phenanthrene	85-01-8	E641A	0.020	µg/L	<0.020	----	----	----	----	----
pyrene	129-00-0	E641A	0.010	µg/L	0.031	----	----	----	----	----
quinoline	91-22-5	E641A	0.050	µg/L	0.077	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%	80.0	----	----	----	----	----
naphthalene-d8	1146-65-2	E641A	0.1	%	77.5	----	----	----	----	----
phenanthrene-d10	1517-22-2	E641A	0.1	%	98.9	----	----	----	----	----

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

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-004088
Your Project #: 11222680-13.1- ORIGINAL LANDFI
Site#: LEACHATE WATER
Site Location: ORIGINAL LANDFILL
Your C.O.C. #: 678160-02-01

Report Date: 2022/12/30
Report #: R3283909
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT**BUREAU VERITAS JOB #: C291540****Received: 2022/11/19, 09:00**

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	2	N/A	2022/11/22	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	2	2022/11/19	2022/11/24	BBY6SOP-00045	SM 23 5210 B m
BTEX/MTBE LH, VH, F1 SIM/MS	2	N/A	2022/11/21	BBY8SOP-00010 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Sep 2017
Chloride/Sulphate by Auto Colourimetry	2	N/A	2022/11/21	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
COD by Colorimeter	2	N/A	2022/11/22	BBY6SOP-00024	SM 23 5220 D m
Total Phenols Calculation (1)	1	N/A	2022/12/02		Auto Calc
Conductivity @25C	2	N/A	2022/11/22	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H ₂ S)	2	N/A	2022/11/23	BBY WI-00033	Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	2	N/A	2022/11/23	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	1	N/A	2022/11/23	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	1	N/A	2022/11/28	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (3)	1	2022/12/15	2022/12/15	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	2	2022/11/25	2022/11/25	AB SOP-00084	BCMOE BCLM Oct2013 m
Hydroxyphenols (Water) (1)	1	2022/11/30	2022/11/30	CAL SOP-00275	EPA 8270e m
ICP-OES Dissolved Metals in Water (3)	1	N/A	2022/11/22	BBY7SOP-00018	EPA 6010d m
ICP-OES Dissolved Metals in Water (3)	1	N/A	2022/11/28	BBY7SOP-00018	EPA 6010d m
EPH in Water when PAH required	2	2022/11/22	2022/11/22	BBY8SOP-00029	BCMOE BCLM Sep2017 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	1	N/A	2022/12/15	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (3)	1	N/A	2022/12/14	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	2022/11/19	2022/11/23	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	2	2022/11/23	2022/11/23	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	2	N/A	2022/11/22	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	2	N/A	2022/11/22	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	2	N/A	2022/11/22	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	2	N/A	2022/11/22	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	2	2022/11/22	2022/11/22	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (4)	2	N/A	2022/11/23	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	2	N/A	2022/11/19	BBY7 WI-00004	SM 23 3030B m

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-004088
Your Project #: 11222680-13.1- ORIGINAL LANDFI
Site#: LEACHATE WATER
Site Location: ORIGINAL LANDFILL
Your C.O.C. #: 678160-02-01

Report Date: 2022/12/30
Report #: R3283909
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT**BUREAU VERITAS JOB #: C291540****Received: 2022/11/19, 09:00**

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Orthophosphate by Konelab (5)	2	N/A	2022/11/22	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	2	N/A	2022/11/23	AB SOP-00080	SM 23 4500 S2-A D Fm
Phenols in Water by GCMS (BC) (1)	1	2022/11/30	2022/11/30	CAL SOP-00164	EPA 8270E m
Total Dissolved Solids (Filt. Residue)	2	2022/11/24	2022/11/25	BBY6SOP-00033	SM 23 2540 C m
EPH less PAH in Water by GC/FID (6)	2	N/A	2022/11/23	BBY WI-00033	Auto Calc
Total Suspended Solids (NFR)	2	2022/11/24	2022/11/25	BBY6SOP-00034	SM 23 2540 D m
Field pH	2	N/A	2022/11/19		
Field Temperature	2	N/A	2022/11/19		
Volatile HC-BTEX (7)	2	N/A	2022/11/22	BBY WI-00033	Auto Calc
PFAS in water by SPE/LC-MS/MS (2, 8)	2	2022/12/12	2022/12/13	CAM SOP-00894	EPA 537 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) This test was performed by Bureau Veritas Campobello, 6740 Campobello Road , Mississauga, ON, L5N 2L8



Attention: Aïresse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-004088
Your Project #: 11222680-13.1- ORIGINAL LANDFI
Site#: LEACHATE WATER
Site Location: ORIGINAL LANDFILL
Your C.O.C. #: 678160-02-01

Report Date: 2022/12/30
Report #: R3283909
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C291540

Received: 2022/11/19, 09:00

- (3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (4) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.
- (5) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (6) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)
HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)
- (7) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)
- (8) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.
- Per- and Polyfluoroalkyl Substances (PFAS) data were evaluated against the prescribed elements for performance and quality in the British Columbia Environmental Laboratory Manual Performance Based PFAS Method (PBM).

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Brody Andersen, B.Sc., B.Sc., Program Specialist–Emergency Spill Response
Email: Brody.Andersen@bureauveritas.com
Phone# (780)577-7120

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Raphael Kwan, Senior Manager, BC and Yukon Regions responsible for British Columbia Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
Site Location: ORIGINAL LANDFILL
Your P.O. #: 735-004088
Sampler Initials: MR

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BHI290	BHI290		BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 10:40		2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-01 Lab-Dup	RDL	WL-11222680-171122- CXW-02	RDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.050 (1)	N/A	0.050	<0.0050	0.0050	A806294

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	950	N/A	0.50	610	0.50	A803334
Nitrate (N)	mg/L	<0.20	N/A	0.20	<0.020	0.020	A803349
Sulphide (as H2S)	mg/L	1.4	N/A	0.019	0.30	0.0038	A803329

Demand Parameters

Biochemical Oxygen Demand	mg/L	31	N/A	3.0	5.6	2.0	A803231
Chemical Oxygen Demand	mg/L	232	N/A	10	71	20	A804369

Field Parameters

Field pH	pH	6.11	N/A	N/A	6.80	N/A	ONSITE
Field Temperature	°C	4.53	N/A	N/A	11.60	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	2300	N/A	2.0	1500	2.0	A806744
Total Dissolved Solids	mg/L	1800	1800	10	960	10	A807429
Total Suspended Solids	mg/L	27 (2)	N/A	2.5	46 (2)	2.5	A808685

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	<1.0	1.0	A806743
Alkalinity (Total as CaCO3)	mg/L	250	N/A	1.0	370	1.0	A806743
Bicarbonate (HCO3)	mg/L	310	N/A	1.0	460	1.0	A806743
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	<1.0	1.0	A806743
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	<1.0	1.0	A806743
Total Sulphide	mg/L	1.3 (3)	N/A	0.018	0.28 (4)	0.0036	A807333
Chloride (Cl)	mg/L	120	N/A	1.0	79	1.0	A805379

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) RDL raised due to sample matrix interference.

(2) RDL raised due to high concentration of solids in the sample.

(3) Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.

(4) Detection limits raised due to sample matrix.

Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.



**BUREAU
VERITAS**

Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
Site Location: ORIGINAL LANDFILL
Your P.O. #: 735-004088
Sampler Initials: MR

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BHI290	BHI290		BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 10:40		2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-01 Lab-Dup	RDL	WL-11222680-171122- CXW-02	RDL	QC Batch
Sulphate (SO4)	mg/L	850	N/A	25	280	5.0	A805379
Nutrients							
Total Ammonia (N)	mg/L	12	N/A	0.15	2.5	0.075	A806140
Orthophosphate (P)	mg/L	<0.0030	<0.0030	0.0030	<0.0030	0.0030	A806249
Nitrate plus Nitrite (N)	mg/L	<0.20 (1)	N/A	0.20	<0.020	0.020	A806292
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) RDL raised due to sample matrix interference.							



BUREAU
VERITAS

Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
Site Location: ORIGINAL LANDFILL
Your P.O. #: 735-004088
Sampler Initials: MR

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BHI290		
Sampling Date		2022/11/17 10:40		
COC Number		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	RDL	QC Batch
Phenols				
2-Hydroxyphenol (Catechol)	ug/L	<20	20	A814321
3-Hydroxyphenol (Resorcinol)	ug/L	<10	10	A814321
4-Hydroxyphenol (Hydroquinone)	ug/L	2.3	1.0	A814321
Total Dichlorophenols	ug/L	0.51	0.22	A810610
Total Chlorophenols	ug/L	2.1	0.41	A810610
Total Monochlorophenols	ug/L	<0.090	0.090	A810610
Total Nonchlorinated Phenols	ug/L	51	1.6	A810610
Total Tetrachlorophenols	ug/L	0.29	0.17	A810610
Total Trichlorophenols	ug/L	0.46	0.24	A810610
SEMI-VOLATILE ORGANICS				
Phenol	ug/L	16	0.50	A814320
2-chlorophenol	ug/L	<0.050	0.050	A814320
3 & 4-chlorophenol	ug/L	<0.075	0.075	A814320
2-methylphenol	ug/L	0.92	0.50	A814320
3 & 4-methylphenol	ug/L	34	0.50	A814320
2-nitrophenol	ug/L	<0.50	0.50	A814320
2,4-dimethylphenol	ug/L	<0.50	0.50	A814320
2,4 + 2,5-Dichlorophenol	ug/L	0.30	0.10	A814320
2,3-Dichlorophenol	ug/L	<0.10	0.10	A814320
2,6-dichlorophenol	ug/L	<0.10	0.10	A814320
3,5-Dichlorophenol	ug/L	<0.10	0.10	A814320
3,4-Dichlorophenol	ug/L	0.20	0.10	A814320
2,4,5-trichlorophenol	ug/L	0.20	0.10	A814320
2,4,6-trichlorophenol	ug/L	<0.10	0.10	A814320
2,3,5-trichlorophenol	ug/L	<0.10	0.10	A814320
2,3,6-Trichlorophenol	ug/L	<0.10	0.10	A814320
2,3,4-trichlorophenol	ug/L	<0.10	0.10	A814320
3,4,5-Trichlorophenol	ug/L	0.26	0.10	A814320
2,4-dinitrophenol	ug/L	<0.50	0.50	A814320
4,6-dinitro-2-methylphenol	ug/L	<0.50	0.50	A814320
2,3,4,6-tetrachlorophenol	ug/L	0.16	0.10	A814320
RDL = Reportable Detection Limit				



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BHI290		
Sampling Date		2022/11/17 10:40		
COC Number		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	RDL	QC Batch
2,3,4,5-tetrachlorophenol	ug/L	<0.10	0.10	A814320
2,3,5,6-tetrachlorophenol	ug/L	0.13	0.10	A814320
4-nitrophenol	ug/L	<0.50	0.50	A814320
2,6-Dimethylphenol	ug/L	<0.50	0.50	A814320
3,4-Dimethylphenol	ug/L	<0.50	0.50	A814320
4-chloro-3-methylphenol	ug/L	<0.10	0.10	A814320
Pentachlorophenol	ug/L	0.81	0.10	A814320
Surrogate Recovery (%)				
2,4,6-TRIBROMOPHENOL (sur.)	%	79	N/A	A814321
2,4-DIBROMOPHENOL (sur.)	%	78	N/A	A814321
2,4,6-TRIBROMOPHENOL (sur.)	%	123	N/A	A814320
2,4-DIBROMOPHENOL (sur.)	%	108	N/A	A814320
RDL = Reportable Detection Limit				
N/A = Not Applicable				



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BHI291		
Sampling Date		2022/11/17 11:46		
COC Number		678160-02-01		
	UNITS	WL-11222680-171122- CXW-02	RDL	QC Batch
Elements				
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	A831800
RDL = Reportable Detection Limit				



**BUREAU
VERITAS**

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BHI290		BHI290			BHI291		
Sampling Date		2022/11/17 10:40		2022/11/17 10:40			2022/11/17 11:46		
COC Number		678160-02-01		678160-02-01			678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	RDL	WL-11222680-171122- CXW-01 Lab-Dup	RDL	QC Batch	WL-11222680-171122- CXW-02	RDL	QC Batch

Dissolved Metals by ICP									
Dissolved Calcium (Ca)	mg/L	318	0.050	317	0.50	A812606	189	0.050	A806255
Dissolved Magnesium (Mg)	mg/L	37.7	0.050	37.5	0.050	A812606	33.6	0.050	A806255
RDL = Reportable Detection Limit									
Lab-Dup = Laboratory Initiated Duplicate									



BUREAU
VERITAS

Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
Site Location: ORIGINAL LANDFILL
Your P.O. #: 735-004088
Sampler Initials: MR

SUBCONTRACTED ANALYSIS (WATER)

Bureau Veritas ID		BHI290		BHI292		
Sampling Date		2022/11/17 10:40		2022/11/18 10:00		
COC Number		678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	RDL	W-11222680-181122- CXW-01	RDL	QC Batch
Perfluorinated Compounds						
Perfluorobutanoic acid	ug/L	0.56	0.020	<0.020	0.020	A835194
Perfluoropentanoic Acid (PFPeA)	ug/L	4.3	0.20	<0.020	0.020	A835194
Perfluorohexanoic Acid (PFHxA)	ug/L	2.3	0.20	<0.020	0.020	A835194
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.84	0.020	<0.020	0.020	A835194
Perfluorooctanoic Acid (PFOA)	ug/L	0.57	0.020	<0.020	0.020	A835194
Perfluorononanoic Acid (PFNA)	ug/L	0.074	0.020	<0.020	0.020	A835194
Perfluorodecanoic Acid (PFDA)	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorotridecanoic Acid	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorotetradecanoic Acid	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorobutanesulfonic acid	ug/L	0.11	0.020	<0.020	0.020	A835194
Perfluoropentanesulfonic acid	ug/L	0.024	0.020	<0.020	0.020	A835194
Perfluorohexanesulfonic acid	ug/L	0.30	0.020	<0.020	0.020	A835194
Perfluoroheptanesulfonic acid	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorooctanesulfonic acid	ug/L	0.66	0.020	<0.020	0.020	A835194
Perfluorononane sulfonic acid	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.020	0.020	<0.020	0.020	A835194
Surrogate Recovery (%)						
13C2-Perfluorodecanoic acid	%	70	N/A	80	N/A	A835194
13C2-Perfluorododecanoic acid	%	56	N/A	62	N/A	A835194
13C2-Perfluorohexanoic acid	%	71	N/A	92	N/A	A835194
13C2-perfluorotetradecanoic acid	%	46	N/A	24	N/A	A835194
13C2-Perfluoroundecanoic acid	%	65	N/A	75	N/A	A835194
13C3-Perfluorobutanesulfonic acid	%	81	N/A	88	N/A	A835194
13C4-Perfluorobutanoic acid	%	77	N/A	87	N/A	A835194
13C4-Perfluoroheptanoic acid	%	69	N/A	87	N/A	A835194
13C4-Perfluorooctanesulfonic acid	%	64	N/A	78	N/A	A835194
13C4-Perfluorooctanoic acid	%	85	N/A	86	N/A	A835194
RDL = Reportable Detection Limit N/A = Not Applicable						



**BUREAU
VERITAS**

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

SUBCONTRACTED ANALYSIS (WATER)

Bureau Veritas ID		BHI290		BHI292		
Sampling Date		2022/11/17 10:40		2022/11/18 10:00		
COC Number		678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	RDL	W-11222680-181122- CXW-01	RDL	QC Batch
13C5-Perfluorononanoic acid	%	84	N/A	83	N/A	A835194
13C5-Perfluoropentanoic acid	%	65	N/A	89	N/A	A835194
13C8-Perfluorooctane Sulfonamide	%	66	N/A	77	N/A	A835194
18O2-Perfluorohexanesulfonic acid	%	83	N/A	85	N/A	A835194
RDL = Reportable Detection Limit N/A = Not Applicable						



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

MISCELLANEOUS (WATER)

Bureau Veritas ID		BHI290	BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-02	RDL	QC Batch
Calculated Parameters					
Total Un-ionized Hydrogen Sulfide as S	mg/L	1.2	0.19	0.0050	A803331
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	1.3	0.20	0.0050	A803331
RDL = Reportable Detection Limit					



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

CSR BTEX/VPH IN WATER (WATER)

Bureau Veritas ID		BHI290	BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-02	RDL	QC Batch
Calculated Parameters					
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	300	A803366
Volatiles					
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	4.0	A804417
Benzene	ug/L	<0.40	<0.40	0.40	A804417
Toluene	ug/L	3.3	<0.40	0.40	A804417
Ethylbenzene	ug/L	1.2	<0.40	0.40	A804417
m & p-Xylene	ug/L	3.0	<0.40	0.40	A804417
o-Xylene	ug/L	1.4	<0.40	0.40	A804417
Styrene	ug/L	<0.40	<0.40	0.40	A804417
Xylenes (Total)	ug/L	4.4	<0.40	0.40	A804417
VH C6-C10	ug/L	<300	<300	300	A804417
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	91	101	N/A	A804417
4-Bromofluorobenzene (sur.)	%	93	95	N/A	A804417
D4-1,2-Dichloroethane (sur.)	%	90	98	N/A	A804417
RDL = Reportable Detection Limit					
N/A = Not Applicable					



BUREAU
VERITAS

Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
Site Location: ORIGINAL LANDFILL
Your P.O. #: 735-004088
Sampler Initials: MR

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Bureau Veritas ID		BHI290	BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-02	RDL	QC Batch
Calculated Parameters					
Low Molecular Weight PAH's	ug/L	5.6	1.3	0.10	A803355
High Molecular Weight PAH's	ug/L	0.12	<0.050	0.050	A803355
Total PAH	ug/L	5.7	1.3	0.10	A803355
Polycyclic Aromatics					
Quinoline	ug/L	0.34	0.025	0.020	A805995
Naphthalene	ug/L	3.2	0.65	0.10	A805995
1-Methylnaphthalene	ug/L	0.29	0.12	0.050	A805995
2-Methylnaphthalene	ug/L	0.39	<0.10	0.10	A805995
Acenaphthylene	ug/L	<0.050	<0.050	0.050	A805995
Acenaphthene	ug/L	0.71	0.22	0.050	A805995
Fluorene	ug/L	0.38	0.053 (1)	0.050	A805995
Phenanthrene	ug/L	0.26	<0.050	0.050	A805995
Anthracene	ug/L	0.026	0.029	0.010	A805995
Acridine	ug/L	<0.050	0.20	0.050	A805995
Fluoranthene	ug/L	0.062	<0.020	0.020	A805995
Pyrene	ug/L	0.048	<0.020	0.020	A805995
Benzo(a)anthracene	ug/L	0.013	<0.010	0.010	A805995
Chrysene	ug/L	<0.020	<0.020	0.020	A805995
Benzo(b&j)fluoranthene	ug/L	<0.030	<0.030	0.030	A805995
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	0.050	A805995
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	0.0050	A805995
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	0.050	A805995
Dibenz(a,h)anthracene	ug/L	<0.0030	<0.0030	0.0030	A805995
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	0.050	A805995
Calculated Parameters					
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	0.20	A803364
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	0.20	A803364
Ext. Pet. Hydrocarbon					
EPH (C10-C19)	mg/L	<0.20	<0.20	0.20	A806003
RDL = Reportable Detection Limit					
(1) Tentatively identified result and may be potentially biased high due to matrix interference.					



**BUREAU
VERITAS**

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Bureau Veritas ID		BHI290	BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-02	RDL	QC Batch
EPH (C19-C32)	mg/L	<0.20	<0.20	0.20	A806003
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	97	98	N/A	A806003
D10-ANTHRACENE (sur.)	%	99	98	N/A	A805995
D8-ACENAPHTHYLENE (sur.)	%	103	100	N/A	A805995
D8-NAPHTHALENE (sur.)	%	97	94	N/A	A805995
TERPHENYL-D14 (sur.)	%	90	85	N/A	A805995
RDL = Reportable Detection Limit					
N/A = Not Applicable					



CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI291		
Sampling Date		2022/11/17 11:46		
COC Number		678160-02-01		
	UNITS	WL-11222680-171122- CXW-02	RDL	QC Batch
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	ug/L	21.5	6.0	A830704
Dissolved Antimony (Sb)	ug/L	<1.0	1.0	A830704
Dissolved Arsenic (As)	ug/L	0.91	0.20	A830704
Dissolved Barium (Ba)	ug/L	61.4	2.0	A830704
Dissolved Beryllium (Be)	ug/L	<0.20	0.20	A830704
Dissolved Bismuth (Bi)	ug/L	<2.0	2.0	A830704
Dissolved Boron (B)	ug/L	307	100	A830704
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	A830704
Dissolved Chromium (Cr)	ug/L	<2.0	2.0	A830704
Dissolved Cobalt (Co)	ug/L	3.62	0.40	A830704
Dissolved Copper (Cu)	ug/L	<0.40	0.40	A830704
Dissolved Iron (Fe)	ug/L	36400	10	A830704
Dissolved Lead (Pb)	ug/L	<0.40	0.40	A830704
Dissolved Lithium (Li)	ug/L	<4.0	4.0	A830704
Dissolved Manganese (Mn)	ug/L	10100	2.0	A830704
Dissolved Molybdenum (Mo)	ug/L	<2.0	2.0	A830704
Dissolved Nickel (Ni)	ug/L	<2.0	2.0	A830704
Dissolved Phosphorus (P)	ug/L	34	20	A830704
Dissolved Selenium (Se)	ug/L	0.22	0.20	A830704
Dissolved Silicon (Si)	ug/L	5780	200	A830704
Dissolved Silver (Ag)	ug/L	<0.040	0.040	A830704
Dissolved Strontium (Sr)	ug/L	724	2.0	A830704
Dissolved Thallium (Tl)	ug/L	<0.020	0.020	A830704
Dissolved Tin (Sn)	ug/L	<10	10	A830704
Dissolved Titanium (Ti)	ug/L	<10	10	A830704
Dissolved Uranium (U)	ug/L	<0.20	0.20	A830704
Dissolved Vanadium (V)	ug/L	<10	10	A830704
Dissolved Zinc (Zn)	ug/L	<10	10	A830704
Dissolved Zirconium (Zr)	ug/L	0.31	0.20	A830704
Dissolved Potassium (K)	mg/L	6.98	0.10	A826637
Dissolved Sodium (Na)	mg/L	72.5	0.10	A826637
RDL = Reportable Detection Limit				



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI291		
Sampling Date		2022/11/17 11:46		
COC Number		678160-02-01		
	UNITS	WL-11222680-171122- CXW-02	RDL	QC Batch
Dissolved Sulphur (S)	mg/L	106	6.0	A826637
RDL = Reportable Detection Limit				



BUREAU
VERITAS

Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
Site Location: ORIGINAL LANDFILL
Your P.O. #: 735-004088
Sampler Initials: MR

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI290	BHI290		BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 10:40		2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-01 Lab-Dup	RDL	WL-11222680-171122- CXW-02	RDL	QC Batch

Elements							
Total Mercury (Hg)	ug/L	0.0062	0.0061	0.0019	<0.0019 (1)	0.0019	A809424
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	1580	N/A	15	84.6	6.0	A807127
Total Antimony (Sb)	ug/L	<2.5	N/A	2.5	<1.0	1.0	A807127
Total Arsenic (As)	ug/L	5.07	N/A	0.50	1.03	0.20	A807127
Total Barium (Ba)	ug/L	64.6	N/A	5.0	59.1	2.0	A807127
Total Beryllium (Be)	ug/L	<0.50	N/A	0.50	<0.20	0.20	A807127
Total Bismuth (Bi)	ug/L	<5.0	N/A	5.0	<2.0	2.0	A807127
Total Boron (B)	ug/L	7300	N/A	250	221	100	A807127
Total Cadmium (Cd)	ug/L	0.221	N/A	0.050	<0.020	0.020	A807127
Total Chromium (Cr)	ug/L	5.3	N/A	5.0	<2.0	2.0	A807127
Total Cobalt (Co)	ug/L	8.9	N/A	1.0	3.60	0.40	A807127
Total Copper (Cu)	ug/L	40.2	N/A	2.5	1.0	1.0	A807127
Total Iron (Fe)	ug/L	15200	N/A	50	35100	20	A807127
Total Lead (Pb)	ug/L	<1.0	N/A	1.0	<0.40	0.40	A807127
Total Lithium (Li)	ug/L	<10	N/A	10	<4.0	4.0	A807127
Total Manganese (Mn)	ug/L	2810	N/A	5.0	9540	2.0	A807127
Total Molybdenum (Mo)	ug/L	<5.0	N/A	5.0	<2.0	2.0	A807127
Total Nickel (Ni)	ug/L	9.3	N/A	5.0	<2.0	2.0	A807127
Total Phosphorus (P)	ug/L	330	N/A	50	43	20	A807127
Total Selenium (Se)	ug/L	0.56	N/A	0.50	0.20	0.20	A807127
Total Silicon (Si)	ug/L	9320	N/A	500	5650	200	A807127
Total Silver (Ag)	ug/L	<0.10	N/A	0.10	<0.040	0.040	A807127
Total Strontium (Sr)	ug/L	1580	N/A	5.0	697	2.0	A807127
Total Thallium (Tl)	ug/L	<0.050	N/A	0.050	<0.020	0.020	A807127
Total Tin (Sn)	ug/L	<25	N/A	25	<10	10	A807127
Total Titanium (Ti)	ug/L	<25	N/A	25	<10	10	A807127
Total Uranium (U)	ug/L	0.75	N/A	0.50	<0.20	0.20	A807127

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) Matrix spike exceeds acceptance limits due to probable matrix interference.



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Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI290	BHI290		BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 10:40		2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-01 Lab-Dup	RDL	WL-11222680-171122- CXW-02	RDL	QC Batch
Total Vanadium (V)	ug/L	<25	N/A	25	<10	10	A807127
Total Zinc (Zn)	ug/L	249	N/A	25	<10	10	A807127
Total Zirconium (Zr)	ug/L	<0.50	N/A	0.50	0.31	0.20	A807127
Total Calcium (Ca)	mg/L	268	N/A	0.25	186	0.10	A803344
Total Magnesium (Mg)	mg/L	32.9	N/A	0.25	32.5	0.10	A803344
Total Potassium (K)	mg/L	33.8	N/A	0.25	6.85	0.10	A803344
Total Sodium (Na)	mg/L	171	N/A	0.25	70.2	0.10	A803344
Total Sulphur (S)	mg/L	291	N/A	15	101	6.0	A803344
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							
N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

GENERAL COMMENTS

Change Request: Report to include results for Full Dissolved Metals with Hg on sample CXW-02 as per client request received 2022/12/09.

Version 4: Report reissued to reflect corrected dissolved metals parameters on sample WL-11222680-171122-CXW-02 (BHI291) - duplicate Ca and Mg results removed.

Sample BHI290 [WL-11222680-171122-CXW-01] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Per- and polyfluoroalkyl substances (PFAS): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample BHI291 [WL-11222680-171122-CXW-02] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Results relate only to the items tested.

BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

QUALITY ASSURANCE REPORT

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A804417	1,4-Difluorobenzene (sur.)	2022/11/21	114	70 - 130	98	70 - 130	105	%		
A804417	4-Bromofluorobenzene (sur.)	2022/11/21	93	70 - 130	86	70 - 130	99	%		
A804417	D4-1,2-Dichloroethane (sur.)	2022/11/21	113	70 - 130	93	70 - 130	105	%		
A805995	D10-ANTHRACENE (sur.)	2022/11/22	83	50 - 140	103	50 - 140	102	%		
A805995	D8-ACENAPHTHYLENE (sur.)	2022/11/22	99	50 - 140	101	50 - 140	101	%		
A805995	D8-NAPHTHALENE (sur.)	2022/11/22	97	50 - 140	93	50 - 140	98	%		
A805995	TERPHENYL-D14 (sur.)	2022/11/22	59	50 - 140	97	50 - 140	86	%		
A806003	O-TERPHENYL (sur.)	2022/11/22	100	60 - 140	98	60 - 140	98	%		
A814320	2,4,6-TRIBROMOPHENOL (sur.)	2022/11/30			114	60 - 130	115	%		
A814320	2,4-DIBROMOPHENOL (sur.)	2022/11/30			101	60 - 130	106	%		
A814321	2,4,6-TRIBROMOPHENOL (sur.)	2022/11/30			71	60 - 130	69	%		
A814321	2,4-DIBROMOPHENOL (sur.)	2022/11/30			72	60 - 130	71	%		
A835194	13C2-Perfluorodecanoic acid	2022/12/13			86	10 - 130	84	%		
A835194	13C2-Perfluorododecanoic acid	2022/12/13			79	10 - 130	75	%		
A835194	13C2-Perfluorohexanoic acid	2022/12/13			89	10 - 130	94	%		
A835194	13C2-perfluorotetradecanoic acid	2022/12/13			64	10 - 130	56	%		
A835194	13C2-Perfluoroundecanoic acid	2022/12/13			82	10 - 130	81	%		
A835194	13C3-Perfluorobutanesulfonic acid	2022/12/13			88	10 - 130	90	%		
A835194	13C4-Perfluorobutanoic acid	2022/12/13			88	10 - 130	90	%		
A835194	13C4-Perfluoroheptanoic acid	2022/12/13			89	10 - 130	89	%		
A835194	13C4-Perfluorooctanesulfonic acid	2022/12/13			85	10 - 130	78	%		
A835194	13C4-Perfluorooctanoic acid	2022/12/13			89	10 - 130	88	%		
A835194	13C5-Perfluorononanoic acid	2022/12/13			88	10 - 130	83	%		
A835194	13C5-Perfluoropentanoic acid	2022/12/13			89	10 - 130	90	%		
A835194	13C8-Perfluorooctane Sulfonamide	2022/12/13			80	10 - 130	84	%		
A835194	18O2-Perfluorohexanesulfonic acid	2022/12/13			88	10 - 130	85	%		
A803231	Biochemical Oxygen Demand	2022/11/24			99	85 - 115	<2.0	mg/L	1.1 (1)	20
A804369	Chemical Oxygen Demand	2022/11/22	NC	80 - 120	104	80 - 120	<10	mg/L	0.70 (1)	20
A804417	Benzene	2022/11/21	129	70 - 130	107	70 - 130	<0.40	ug/L	NC (1)	30
A804417	Ethylbenzene	2022/11/21	103	70 - 130	105	70 - 130	<0.40	ug/L	NC (1)	30
A804417	m & p-Xylene	2022/11/21	113	70 - 130	101	70 - 130	<0.40	ug/L	NC (1)	30



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Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A804417	Methyl-tert-butylether (MTBE)	2022/11/21	101	70 - 130	96	70 - 130	<4.0	ug/L	NC (1)	30
A804417	o-Xylene	2022/11/21	109	70 - 130	101	70 - 130	<0.40	ug/L	NC (1)	30
A804417	Styrene	2022/11/21	112	70 - 130	104	70 - 130	<0.40	ug/L	NC (1)	30
A804417	Toluene	2022/11/21	122	70 - 130	107	70 - 130	<0.40	ug/L	NC (1)	30
A804417	VH C6-C10	2022/11/21			86	70 - 130	<300	ug/L	NC (1)	30
A804417	Xylenes (Total)	2022/11/21					<0.40	ug/L	NC (1)	30
A805379	Chloride (Cl)	2022/11/21	109	80 - 120	103	80 - 120	<1.0	mg/L	2.7 (1)	20
A805379	Sulphate (SO4)	2022/11/21	NC	80 - 120	99	80 - 120	<1.0	mg/L	3.0 (1)	20
A805995	1-Methylnaphthalene	2022/11/22	87	50 - 140	86	50 - 140	<0.050	ug/L	NC (1)	40
A805995	2-Methylnaphthalene	2022/11/22	89	50 - 140	88	50 - 140	<0.10	ug/L	NC (1)	40
A805995	Acenaphthene	2022/11/22	92	50 - 140	93	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Acenaphthylene	2022/11/22	89	50 - 140	91	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Acridine	2022/11/22	100	50 - 140	98	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Anthracene	2022/11/22	91	50 - 140	96	50 - 140	<0.010	ug/L	NC (1)	40
A805995	Benzo(a)anthracene	2022/11/22	19 (2)	50 - 140	90	50 - 140	<0.010	ug/L	NC (1)	40
A805995	Benzo(a)pyrene	2022/11/22	4.5 (2)	50 - 140	105	50 - 140	<0.0050	ug/L	NC (1)	40
A805995	Benzo(b&j)fluoranthene	2022/11/22	4.6 (2)	50 - 140	95	50 - 140	<0.030	ug/L	NC (1)	40
A805995	Benzo(g,h,i)perylene	2022/11/22	2.1 (2)	50 - 140	91	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Benzo(k)fluoranthene	2022/11/22	5.1 (2)	50 - 140	92	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Chrysene	2022/11/22	19 (2)	50 - 140	91	50 - 140	<0.020	ug/L	NC (1)	40
A805995	Dibenz(a,h)anthracene	2022/11/22	2.2 (2)	50 - 140	97	50 - 140	<0.0030	ug/L	NC (1)	40
A805995	Fluoranthene	2022/11/22	73	50 - 140	80	50 - 140	<0.020	ug/L	NC (1)	40
A805995	Fluorene	2022/11/22	92	50 - 140	94	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Indeno(1,2,3-cd)pyrene	2022/11/22	2.2 (2)	50 - 140	95	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Naphthalene	2022/11/22	84	50 - 140	82	50 - 140	<0.10	ug/L	NC (1)	40
A805995	Phenanthrene	2022/11/22	87	50 - 140	91	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Pyrene	2022/11/22	75	50 - 140	81	50 - 140	<0.020	ug/L	NC (1)	40
A805995	Quinoline	2022/11/22	100	50 - 140	99	50 - 140	<0.020	ug/L	NC (1)	40
A806003	EPH (C10-C19)	2022/11/22	88	60 - 140	87	70 - 130	<0.20	mg/L	NC (1)	30
A806003	EPH (C19-C32)	2022/11/22	112	60 - 140	109	70 - 130	<0.20	mg/L	NC (1)	30
A806140	Total Ammonia (N)	2022/11/22	97	80 - 120	100	80 - 120	<0.015	mg/L	NC (1)	20



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Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A806249	Orthophosphate (P)	2022/11/22	93 (3)	80 - 120	108	80 - 120	<0.0030	mg/L	NC (4)	20
A806255	Dissolved Calcium (Ca)	2022/11/22	100	80 - 120	102	80 - 120	<0.050	mg/L	1.4 (1)	20
A806255	Dissolved Magnesium (Mg)	2022/11/22	102	80 - 120	100	80 - 120	<0.050	mg/L	0.19 (1)	20
A806292	Nitrate plus Nitrite (N)	2022/11/22	110	80 - 120	107	80 - 120	<0.020	mg/L	NC (1)	25
A806294	Nitrite (N)	2022/11/22	106	80 - 120	101	80 - 120	<0.0050	mg/L	NC (1)	20
A806743	Alkalinity (PP as CaCO ₃)	2022/11/22					<1.0	mg/L		
A806743	Alkalinity (Total as CaCO ₃)	2022/11/22			96	80 - 120	<1.0	mg/L		
A806743	Bicarbonate (HCO ₃)	2022/11/22					<1.0	mg/L		
A806743	Carbonate (CO ₃)	2022/11/22					<1.0	mg/L		
A806743	Hydroxide (OH)	2022/11/22					<1.0	mg/L		
A806744	Conductivity	2022/11/22			104	80 - 120	<2.0	uS/cm		
A807127	Total Aluminum (Al)	2022/11/23	100	80 - 120	99	80 - 120	<3.0	ug/L		
A807127	Total Antimony (Sb)	2022/11/23	105	80 - 120	105	80 - 120	<0.50	ug/L		
A807127	Total Arsenic (As)	2022/11/23	106	80 - 120	105	80 - 120	<0.10	ug/L		
A807127	Total Barium (Ba)	2022/11/23	101	80 - 120	102	80 - 120	<1.0	ug/L		
A807127	Total Beryllium (Be)	2022/11/23	98	80 - 120	98	80 - 120	<0.10	ug/L		
A807127	Total Bismuth (Bi)	2022/11/23	101	80 - 120	100	80 - 120	<1.0	ug/L		
A807127	Total Boron (B)	2022/11/23	97	80 - 120	97	80 - 120	<50	ug/L		
A807127	Total Cadmium (Cd)	2022/11/23	102	80 - 120	101	80 - 120	<0.010	ug/L		
A807127	Total Chromium (Cr)	2022/11/23	101	80 - 120	101	80 - 120	<1.0	ug/L		
A807127	Total Cobalt (Co)	2022/11/23	97	80 - 120	97	80 - 120	<0.20	ug/L		
A807127	Total Copper (Cu)	2022/11/23	100	80 - 120	99	80 - 120	<0.50	ug/L		
A807127	Total Iron (Fe)	2022/11/23	102	80 - 120	104	80 - 120	<10	ug/L	2.2 (1)	20
A807127	Total Lead (Pb)	2022/11/23	101	80 - 120	100	80 - 120	<0.20	ug/L		
A807127	Total Lithium (Li)	2022/11/23	94	80 - 120	94	80 - 120	<2.0	ug/L		
A807127	Total Manganese (Mn)	2022/11/23	101	80 - 120	100	80 - 120	<1.0	ug/L	6.5 (1)	20
A807127	Total Molybdenum (Mo)	2022/11/23	104	80 - 120	103	80 - 120	<1.0	ug/L		
A807127	Total Nickel (Ni)	2022/11/23	100	80 - 120	100	80 - 120	<1.0	ug/L		
A807127	Total Phosphorus (P)	2022/11/23	103	80 - 120	102	80 - 120	<10	ug/L		
A807127	Total Selenium (Se)	2022/11/23	105	80 - 120	106	80 - 120	<0.10	ug/L		
A807127	Total Silicon (Si)	2022/11/23	117	80 - 120	112	80 - 120	<100	ug/L		



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Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A807127	Total Silver (Ag)	2022/11/23	101	80 - 120	100	80 - 120	<0.020	ug/L		
A807127	Total Strontium (Sr)	2022/11/23	102	80 - 120	103	80 - 120	<1.0	ug/L		
A807127	Total Thallium (Tl)	2022/11/23	104	80 - 120	102	80 - 120	<0.010	ug/L		
A807127	Total Tin (Sn)	2022/11/23	102	80 - 120	101	80 - 120	<5.0	ug/L		
A807127	Total Titanium (Ti)	2022/11/23	103	80 - 120	103	80 - 120	<5.0	ug/L		
A807127	Total Uranium (U)	2022/11/23	104	80 - 120	104	80 - 120	<0.10	ug/L		
A807127	Total Vanadium (V)	2022/11/23	102	80 - 120	101	80 - 120	<5.0	ug/L		
A807127	Total Zinc (Zn)	2022/11/23	104	80 - 120	101	80 - 120	<5.0	ug/L		
A807127	Total Zirconium (Zr)	2022/11/23	104	80 - 120	102	80 - 120	<0.10	ug/L		
A807333	Total Sulphide	2022/11/23	109	80 - 120	110	80 - 120	<0.0018	mg/L	6.9 (1)	20
A807429	Total Dissolved Solids	2022/11/25	104	80 - 120	101	80 - 120	<10	mg/L	0.88 (4)	20
A808685	Total Suspended Solids	2022/11/25	93	80 - 120	103	80 - 120	<1.0	mg/L	NC (1)	20
A809424	Total Mercury (Hg)	2022/11/25	77 (2,5)	80 - 120	93	80 - 120	<0.0019	ug/L	0.49 (6)	20
A812606	Dissolved Calcium (Ca)	2022/11/28	NC (7)	80 - 120	106	80 - 120	<0.050	mg/L	0.54 (8)	20
A812606	Dissolved Magnesium (Mg)	2022/11/28	NC (7)	80 - 120	101	80 - 120	<0.050	mg/L	0.54 (8)	20
A814320	2,3,4,5-tetrachlorophenol	2022/11/30			114	60 - 130	<0.10	ug/L		
A814320	2,3,4,6-tetrachlorophenol	2022/11/30			129	60 - 130	<0.10	ug/L		
A814320	2,3,4-trichlorophenol	2022/11/30			111	60 - 130	<0.10	ug/L		
A814320	2,3,5,6-tetrachlorophenol	2022/11/30			103	60 - 130	<0.10	ug/L		
A814320	2,3,5-trichlorophenol	2022/11/30			104	60 - 130	<0.10	ug/L		
A814320	2,3,6-Trichlorophenol	2022/11/30			106	60 - 130	<0.10	ug/L		
A814320	2,3-Dichlorophenol	2022/11/30			104	60 - 130	<0.10	ug/L		
A814320	2,4 + 2,5-Dichlorophenol	2022/11/30			106	60 - 130	<0.10	ug/L		
A814320	2,4,5-trichlorophenol	2022/11/30			110	60 - 130	<0.10	ug/L		
A814320	2,4,6-trichlorophenol	2022/11/30			105	60 - 130	<0.10	ug/L		
A814320	2,4-dimethylphenol	2022/11/30			98	60 - 130	<0.50	ug/L		
A814320	2,4-dinitrophenol	2022/11/30			120	30 - 130	<0.50	ug/L		
A814320	2,6-dichlorophenol	2022/11/30			105	60 - 130	<0.10	ug/L		
A814320	2,6-Dimethylphenol	2022/11/30			98	60 - 130	<0.50	ug/L		
A814320	2-chlorophenol	2022/11/30			92	60 - 130	<0.050	ug/L		
A814320	2-methylphenol	2022/11/30			88	60 - 130	<0.50	ug/L		



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Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A814320	2-nitrophenol	2022/11/30			107	60 - 130	<0.50	ug/L		
A814320	3 & 4-chlorophenol	2022/11/30			96	60 - 130	<0.075	ug/L		
A814320	3 & 4-methylphenol	2022/11/30			85	60 - 130	<0.50	ug/L		
A814320	3,4,5-Trichlorophenol	2022/11/30			100	60 - 130	<0.10	ug/L		
A814320	3,4-Dichlorophenol	2022/11/30			97	60 - 130	<0.10	ug/L		
A814320	3,4-Dimethylphenol	2022/11/30			94	60 - 130	<0.50	ug/L		
A814320	3,5-Dichlorophenol	2022/11/30			108	60 - 130	<0.10	ug/L		
A814320	4,6-dinitro-2-methylphenol	2022/11/30			128	30 - 130	<0.50	ug/L		
A814320	4-chloro-3-methylphenol	2022/11/30			98	60 - 130	<0.10	ug/L		
A814320	4-nitrophenol	2022/11/30			68	60 - 130	<0.50	ug/L		
A814320	Pentachlorophenol	2022/11/30			104	60 - 130	<0.10	ug/L		
A814320	Phenol	2022/11/30			111	60 - 130	<0.50	ug/L		
A814321	2-Hydroxyphenol (Catechol)	2022/11/30			99	60 - 130	<20	ug/L		
A814321	3-Hydroxyphenol (Resorcinol)	2022/11/30			93	60 - 130	<10	ug/L		
A814321	4-Hydroxyphenol (Hydroquinone)	2022/11/30			93	60 - 130	<1.0	ug/L		
A830704	Dissolved Aluminum (Al)	2022/12/14	97	80 - 120	97	80 - 120	<3.0	ug/L	1.2 (1)	20
A830704	Dissolved Antimony (Sb)	2022/12/14	100	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20
A830704	Dissolved Arsenic (As)	2022/12/14	104	80 - 120	101	80 - 120	<0.10	ug/L	0.21 (1)	20
A830704	Dissolved Barium (Ba)	2022/12/14	95	80 - 120	98	80 - 120	<1.0	ug/L	0.56 (1)	20
A830704	Dissolved Beryllium (Be)	2022/12/14	96	80 - 120	97	80 - 120	<0.10	ug/L	NC (1)	20
A830704	Dissolved Bismuth (Bi)	2022/12/14	92	80 - 120	97	80 - 120	<1.0	ug/L	NC (1)	20
A830704	Dissolved Boron (B)	2022/12/14	99	80 - 120	101	80 - 120	<50	ug/L	NC (1)	20
A830704	Dissolved Cadmium (Cd)	2022/12/14	97	80 - 120	98	80 - 120	<0.010	ug/L	NC (1)	20
A830704	Dissolved Chromium (Cr)	2022/12/14	98	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A830704	Dissolved Cobalt (Co)	2022/12/14	93	80 - 120	95	80 - 120	<0.20	ug/L	NC (1)	20
A830704	Dissolved Copper (Cu)	2022/12/14	94	80 - 120	98	80 - 120	<0.20	ug/L	8.2 (1)	20
A830704	Dissolved Iron (Fe)	2022/12/14	102	80 - 120	99	80 - 120	<5.0	ug/L	8.5 (1)	20
A830704	Dissolved Lead (Pb)	2022/12/14	95	80 - 120	98	80 - 120	<0.20	ug/L	NC (1)	20
A830704	Dissolved Lithium (Li)	2022/12/14	94	80 - 120	94	80 - 120	<2.0	ug/L	NC (1)	20
A830704	Dissolved Manganese (Mn)	2022/12/14	97	80 - 120	99	80 - 120	<1.0	ug/L	5.5 (1)	20
A830704	Dissolved Molybdenum (Mo)	2022/12/14	105	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20



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GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A830704	Dissolved Nickel (Ni)	2022/12/14	94	80 - 120	97	80 - 120	<1.0	ug/L	NC (1)	20
A830704	Dissolved Phosphorus (P)	2022/12/14	106	80 - 120	100	80 - 120	<10	ug/L		
A830704	Dissolved Selenium (Se)	2022/12/14	100	80 - 120	97	80 - 120	<0.10	ug/L	NC (1)	20
A830704	Dissolved Silicon (Si)	2022/12/14	105	80 - 120	112	80 - 120	<100	ug/L	0.086 (1)	20
A830704	Dissolved Silver (Ag)	2022/12/14	97	80 - 120	97	80 - 120	<0.020	ug/L	NC (1)	20
A830704	Dissolved Strontium (Sr)	2022/12/14	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.37 (1)	20
A830704	Dissolved Thallium (Tl)	2022/12/14	97	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
A830704	Dissolved Tin (Sn)	2022/12/14	98	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
A830704	Dissolved Titanium (Ti)	2022/12/14	99	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
A830704	Dissolved Uranium (U)	2022/12/14	102	80 - 120	100	80 - 120	<0.10	ug/L	1.5 (1)	20
A830704	Dissolved Vanadium (V)	2022/12/14	99	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20
A830704	Dissolved Zinc (Zn)	2022/12/14	101	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
A830704	Dissolved Zirconium (Zr)	2022/12/14	103	80 - 120	100	80 - 120	<0.10	ug/L	NC (1)	20
A831800	Dissolved Mercury (Hg)	2022/12/15	86	80 - 120	86	80 - 120	<0.0019	ug/L	NC (1)	20
A835194	Perfluorobutanesulfonic acid	2022/12/13			102	70 - 130	<0.020	ug/L	1.2 (1)	30
A835194	Perfluorobutanoic acid	2022/12/13			101	70 - 130	<0.020	ug/L	0.49 (1)	30
A835194	Perfluorodecanesulfonic acid (PFDS)	2022/12/13			93	70 - 130	<0.020	ug/L	3.4 (1)	30
A835194	Perfluorodecanoic Acid (PFDA)	2022/12/13			102	70 - 130	<0.020	ug/L	1.7 (1)	30
A835194	Perfluorododecanoic Acid (PFDoA)	2022/12/13			103	70 - 130	<0.020	ug/L	0.12 (1)	30
A835194	Perfluoroheptanesulfonic acid	2022/12/13			95	70 - 130	<0.020	ug/L	1.2 (1)	30
A835194	Perfluoroheptanoic Acid (PFHpA)	2022/12/13			104	70 - 130	<0.020	ug/L	1.2 (1)	30
A835194	Perfluorohexanesulfonic acid	2022/12/13			101	70 - 130	<0.020	ug/L	0.43 (1)	30
A835194	Perfluorohexanoic Acid (PFHxA)	2022/12/13			103	70 - 130	<0.020	ug/L	0.17 (1)	30
A835194	Perfluorononane sulfonic acid	2022/12/13			88	70 - 130	<0.020	ug/L	3.8 (1)	30
A835194	Perfluorononanoic Acid (PFNA)	2022/12/13			102	70 - 130	<0.020	ug/L	1.6 (1)	30
A835194	Perfluorooctane Sulfonamide (PFOSA)	2022/12/13			98	70 - 130	<0.020	ug/L	2.9 (1)	30
A835194	Perfluorooctanesulfonic acid	2022/12/13			101	70 - 130	<0.020	ug/L	2.1 (1)	30
A835194	Perfluorooctanoic Acid (PFOA)	2022/12/13			103	70 - 130	<0.020	ug/L	0.14 (1)	30
A835194	Perfluoropentanesulfonic acid	2022/12/13			103	70 - 130	<0.020	ug/L	0.50 (1)	30
A835194	Perfluoropentanoic Acid (PFPeA)	2022/12/13			102	70 - 130	<0.020	ug/L	2.4 (1)	30
A835194	Perfluorotetradecanoic Acid	2022/12/13			106	70 - 130	<0.020	ug/L	3.1 (1)	30



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A835194	Perfluorotridecanoic Acid	2022/12/13			117	70 - 130	<0.020	ug/L	2.6 (1)	30
A835194	Perfluoroundecanoic Acid (PFUnA)	2022/12/13			100	70 - 130	<0.020	ug/L	2.0 (1)	30

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Duplicate Parent ID

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(3) Matrix Spike Parent ID [BHI290-04]

(4) Duplicate Parent ID [BHI290-04]

(5) Matrix Spike Parent ID [BHI291-07]

(6) Duplicate Parent ID [BHI290-07]

(7) Matrix Spike Parent ID [BHI290-08]

(8) Duplicate Parent ID [BHI290-08]



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Colm McNamara, Senior Analyst, Liquid Chromatography

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

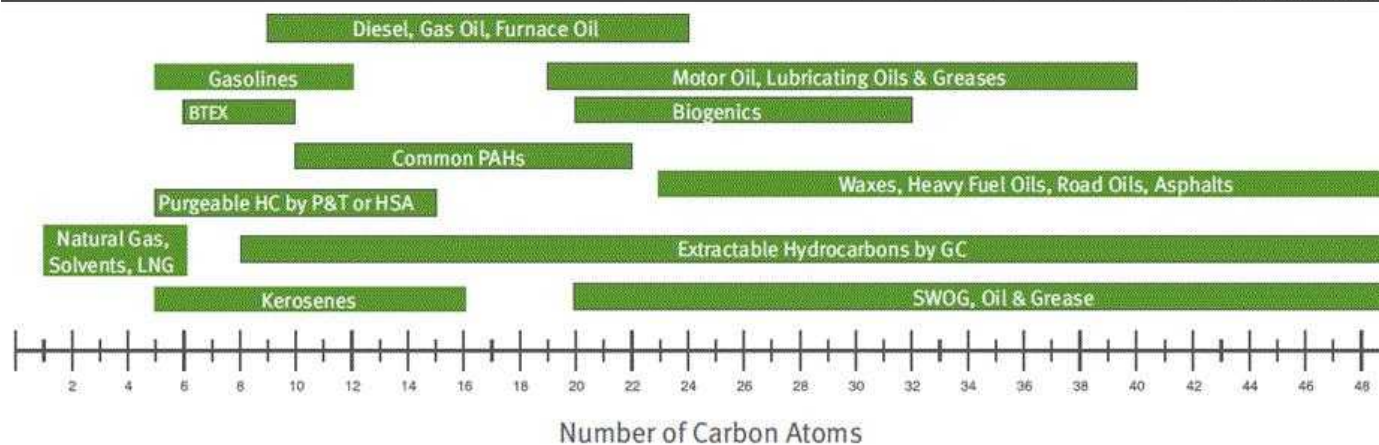
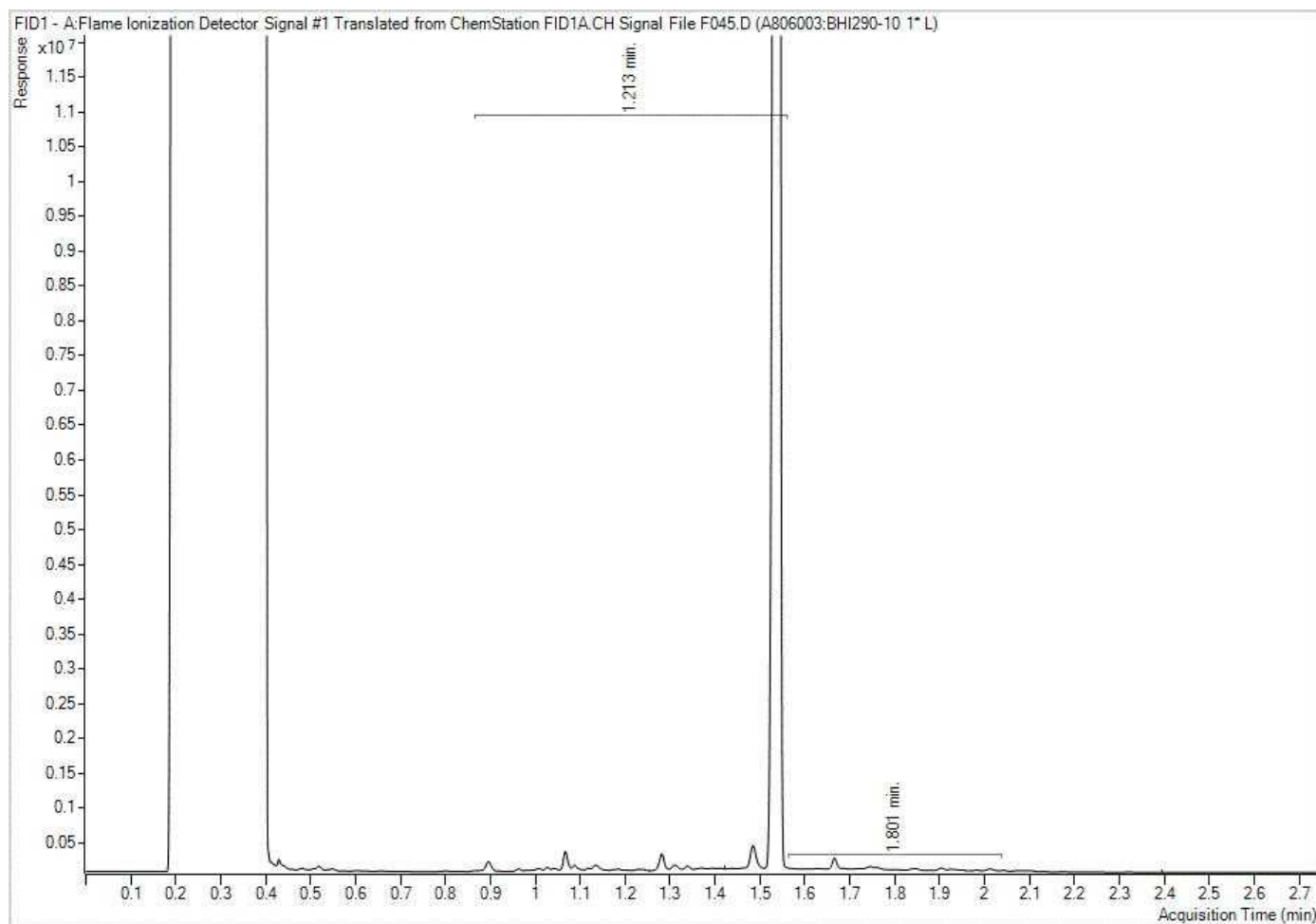


Bureau Veritas Proprietary Software
Logiciel Propriétaire de Bureau Veritas

Automated Statchk

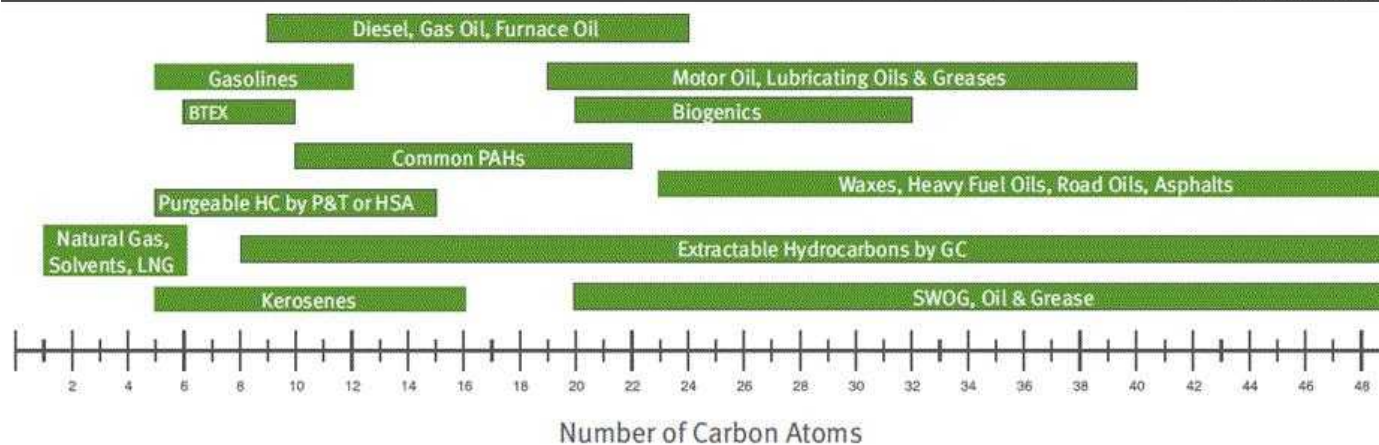
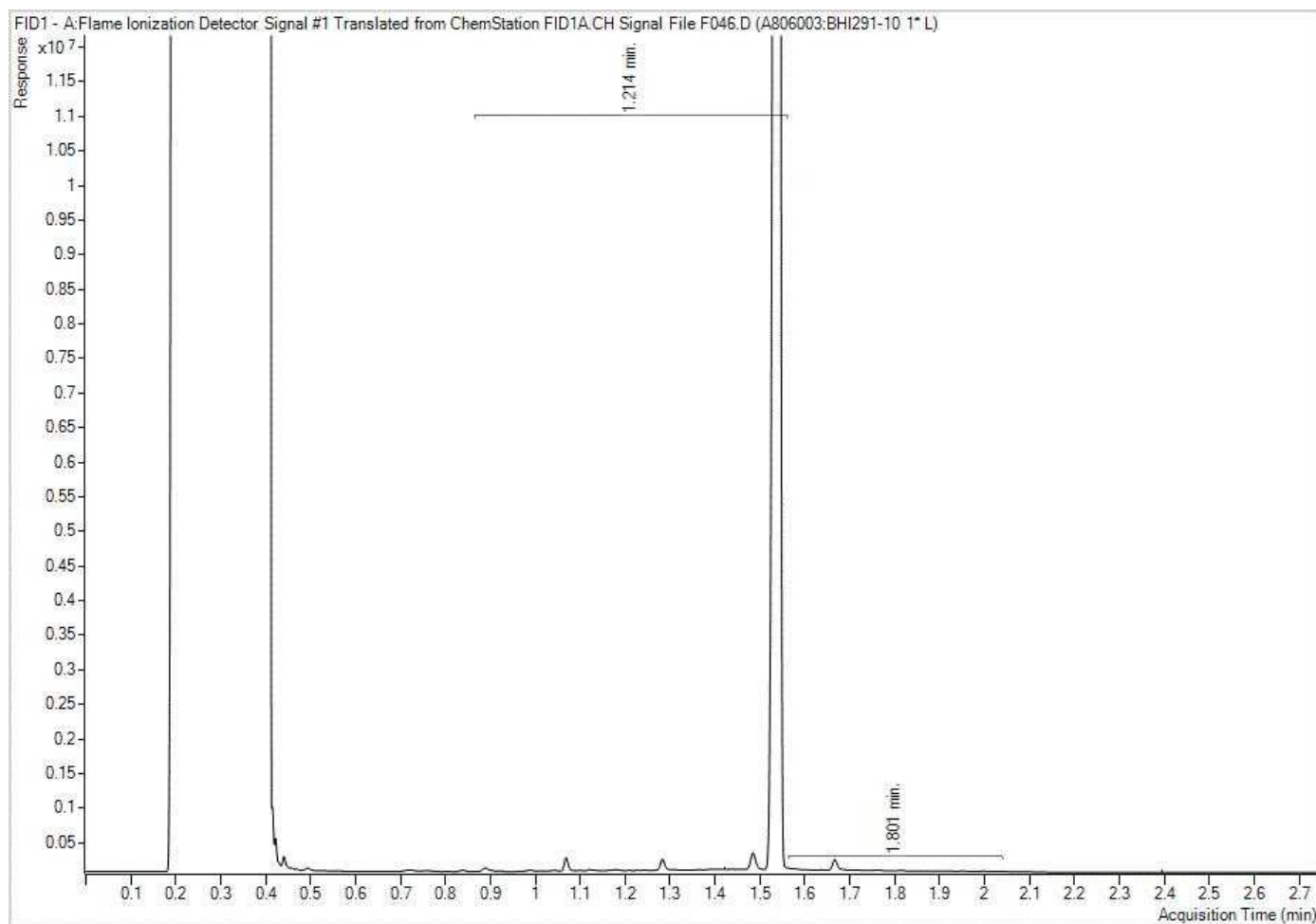
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EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.



Bureau Veritas
4605 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free 800-563-6266 Fax:(604) 731 2366 www.bvna.com

INVOICE TO:

Company Name #163 GHd Limited
Contact Name AP Invoices - 735
Address 455 PHILLIP STREET
WATERLOO ON N2L 3X2
Phone (519) 884-0510 Fax: (519) 725-1394
Email APInvoices-735@ghd.com

Report Information

Company Name
Contact Name Alesse MacPhee
Address
Phone
Email alesse.macphee@ghd.com; National.EDDsupport@na

Project Information

Quotation # C20003
P.O. # 735-004088
Project # 11222680-13.1
Project Name Upland Land Fill
Leachate Water
Site # CYN, MP
Sampled By

C291540_COC

Chain Of Custody Record



Project Manager
Thomas Pinchin

Special Instructions

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT:

(will be applied if Rush TAT is not specified):

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

1 Day ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐

Rush Confirmation Number: ☐

(call lab for #)

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	Conductivity, Cl, SO4, NO2, NO3, N-N, PO4, TDS, TSS, Sp. Alk, BOD5	Total Sulphide, Total H2S, Un-ionized (as H2S) - based on total	Ammonia-N (Total)	Total Metals with CV Hg (NO HARDNESS)	COD, PFOS, PFOA, PFBS, Pnends	Dissolved Hardness, or the phosphate	LEPH/HEPH/PAH / EPH	BTEX/VPH	Field pH	Field Temperature	# of Bottles	Comments
1	WL-11222680-131122-CYN-01	Nov 17, 22	10:40	Leachate	Y	X	X	X	X	X	X	X	X	6.11	4.53	14	
2	WL-11222680-131122-CYN-02	Nov 17, 22	11:46	Leachate	Y	X	X	X	X	X	X	X	X	6.80	11.60	14	
3	WL-11222680-181122-CYN-01	Nov 18, 22	10:10	Water	N											2	ANALYZE FOR PFAS ONLY.
4																	
5																	
6																	
7																	
8																	
9																	
10																	

RECEIVED BY: (Signature/Print)

CARIN WONG

Date: (YYMMDD)

22/11/22

Time

1840

RECEIVED BY: (Signature/Print)

EDNA LUC

Date: (YYMMDD)

2022/11/19

Time

09:00

Jars used and not submitted

Time Sensitive

☐

Temperature (°C) on Receipt

51.2/17

Lab Use Only

Custody Seal Intact on Cooler?

Yes ☒ No ☐

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COO-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

CERTIFICATE OF ANALYSIS

Work Order : **VA22A3490**
Client : **Northwin Environmental Ltd.**
Contact : Mr Brian Fagan
Address : 315 - 1434 Ironwood Street
 Campbell River BC Canada V9W 5T5
Telephone : ----
Project : ----
PO : ----
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : VA2022NTHW1000001
No. of samples received : 2
No. of samples analysed : 2

Page : 1 of 7
Laboratory : Vancouver - Environmental
Account Manager : Sneha Sansare
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 22-Feb-2022 10:45
Date Analysis Commenced : 22-Feb-2022
Issue Date : 23-Feb-2022 22:35

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

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

Unit	Description
-	No Unit
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLCI	Detection Limit Raised: Chromatographic interference due to co-elution.
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)					Client sample ID	New Landfill Holding Pond PRE Treatment 02/14/22	New Landfill Holding Pond 02/14/22	----	----	----
Client sampling date / time						18-Feb-2022 04:30	18-Feb-2022 04:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A3490-001	VA22A3490-002	-----	-----	-----	-----
					Result	Result	----	----	----	----
Anions and Nutrients										
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	1180	884 ^{RRV}	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.214	0.197	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00361	0.00159	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00725	0.00196	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.104	0.0318	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000040 ^{DLA}	<0.000020	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000100 ^{DLA}	<0.000050	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	2.98	0.947	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.000814	0.000407	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	422	153	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000101	0.000044	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	0.00738	0.00223	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.0168	0.00481	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.0278	0.0309	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.804	0.135	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.00180	0.00217	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0117	0.0036	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	17.8	8.08	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	2.65	0.954	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00509	0.00177	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.0164	0.00486	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.159	0.260	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	28.1	9.53	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0218	0.00695	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000396	0.000197	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.02	1.92	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000020 ^{DLA}	<0.000010	----	----	----	----

Upland reports that the sample was collected on Feb 23 not Feb 18



Analytical Results

Sub-Matrix: Water

(Matrix: Water)

Client sample ID

					New Landfill Holding Pond PRE Treatment 02/14/22	New Landfill Holding Pond 02/14/22	----	----	----
Client sampling date / time					18-Feb-2022 04:30	18-Feb-2022 04:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A3490-001	VA22A3490-002	-----	-----	-----
					Result	Result	----	----	----
Dissolved Metals									
sodium, dissolved	7440-23-5	E421	0.050	mg/L	108	40.7	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	1.43	0.447	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	385	113 ^{RRV}	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00040 ^{DLA}	<0.00020	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000057	<0.000010	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00020 ^{DLA}	<0.00010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00084	0.00048	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00174	0.00073	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00020 ^{DLA}	<0.00010	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000530	0.000175	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00150	0.00064	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	1.01	0.126	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	0.00048	<0.00030	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----
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	----	----	----



Analytical Results

Sub-Matrix: Water

(Matrix: Water)

Client sample ID

					New Landfill Holding Pond PRE Treatment 02/14/22	New Landfill Holding Pond 02/14/22	----	----	----
Client sampling date / time					18-Feb-2022 04:30	18-Feb-2022 04:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A3490-001	VA22A3490-002	-----	-----	-----
					Result	Result	----	----	----
Volatile Organic Compounds [Drycleaning]									
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	----	----	----
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	0.53	1.00	----	----	----
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	%	99.8	103	----	----	----
difluorobenzene, 1,4-	540-36-3	E611C	1.0	%	99.9	99.8	----	----	----

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

Client sample ID

Polycyclic Aromatic Hydrocarbons Surrogates



Analytical Results

Sub-Matrix: Water
(Matrix: Water)

					Client sample ID	New Landfill Holding Pond PRE Treatment 02/14/22	New Landfill Holding Pond 02/14/22	----	----	----
					Client sampling date / time	18-Feb-2022 04:30	18-Feb-2022 04:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A3490-001	VA22A3490-002	-----	-----	-----	-----
					Result	Result	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%	98.6	108	----	----	----	----
naphthalene-d8	1146-65-2	E641A	0.1	%	115	122	----	----	----	----
phenanthrene-d10	1517-22-2	E641A	0.1	%	111	123	----	----	----	----

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

CERTIFICATE OF ANALYSIS

Work Order : **VA22A7623**
Client : **Northwin Environmental Ltd.**
Contact : Mr Brian Fagan
Address : 315 - 1434 Ironwood Street
 Campbell River BC Canada V9W 5T5
Telephone : ----
Project : ----
PO : ----
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : VA2022NTHW1000001
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 6
Laboratory : Vancouver - Environmental
Account Manager : Sneha Sansare
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 12-Apr-2022 12:10
Date Analysis Commenced : 12-Apr-2022
Issue Date : 14-Apr-2022 15:52

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Courtney Cox	Analyst	Inorganics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	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.

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

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
mg/L	milligrams per litre

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLQ	Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.



Analytical Results

Sub-Matrix: Water					Client sample ID	New Landfill Aeration Pond	----	----	----	----
(Matrix: Water)					Client sampling date / time	11-Apr-2022 14:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A7623-001	Result	-----	-----	-----	-----
Anions and Nutrients										
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	1050	----	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.132	----	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00360	----	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00827	----	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0733	----	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000100 ^{DLA}	----	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000250 ^{DLA}	----	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	4.73	----	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000250 ^{DLA}	----	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	425	----	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000120	----	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	0.00487	----	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.0100	----	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00561	----	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.226	----	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000250 ^{DLA}	----	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0096	----	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	27.6	----	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	1.89	----	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00435	----	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.0157	----	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.250 ^{DLA}	----	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	36.0	----	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0260	----	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000303	----	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.58	----	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000050 ^{DLA}	----	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	147	----	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	1.66	----	----	----	----	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	New Landfill Aeration Pond	----	----	----	----
Client sampling date / time					11-Apr-2022 14:30	----	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A7623-001	Result	----	----	----	----
Dissolved Metals										
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	355	----	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00100 ^{DLA}	----	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000050 ^{DLA}	----	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00050 ^{DLA}	----	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00098	----	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00218	----	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00050 ^{DLA}	----	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000714	----	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00583	----	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0439	----	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00150 ^{DLA}	----	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----	----
Volatile Organic Compounds										
chlorobenzene	108-90-7	E611C	0.50	µg/L	<0.50	----	----	----	----	----
chloromethane	74-87-3	E611C	5.0	µg/L	<5.0	----	----	----	----	----
dichlorobenzene, 1,2-	95-50-1	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichlorobenzene, 1,3-	541-73-1	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichlorobenzene, 1,4-	106-46-7	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloropropane, 1,2-	78-87-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloropropylene, cis+trans-1,3-	542-75-6	E611C	0.75	µg/L	<0.75	----	----	----	----	----
dichloropropylene, cis-1,3-	10061-01-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----
tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.50	µg/L	<0.50	----	----	----	----	----
tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.20	µg/L	<0.20	----	----	----	----	----
trichloroethane, 1,1,2-	79-00-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----
trichlorofluoromethane	75-69-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----
Volatile Organic Compounds [Drycleaning]										
carbon tetrachloride	56-23-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----
chloroethane	75-00-3	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloroethane, 1,1-	75-34-3	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloroethane, 1,2-	107-06-2	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloroethylene, 1,1-	75-35-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----

Sub-Matrix: Water					Client sample ID	New Landfill Aeration Pond	----	----	----	----
(Matrix: Water)										
Client sampling date / time					11-Apr-2022 14:30	----	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A7623-001	-----	-----	-----	-----	-----
					Result	----	----	----	----	----
Volatile Organic Compounds [Drycleaning]										
dichloroethylene, cis-1,2-	156-59-2	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloroethylene, trans-1,2-	156-60-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloromethane	75-09-2	E611C	1.0	µg/L	<1.0	----	----	----	----	----
dichloropropylene, trans-1,3-	10061-02-6	E611C	0.50	µg/L	<0.50	----	----	----	----	----
tetrachloroethylene	127-18-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----
trichloroethane, 1,1,1-	71-55-6	E611C	0.50	µg/L	<0.50	----	----	----	----	----
trichloroethylene	79-01-6	E611C	0.50	µg/L	<0.50	----	----	----	----	----
vinyl chloride	75-01-4	E611C	0.40	µg/L	<0.40	----	----	----	----	----
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611C	0.50	µg/L	<0.50	----	----	----	----	----
ethylbenzene	100-41-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----
styrene	100-42-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----
toluene	108-88-3	E611C	0.40	µg/L	<0.40	----	----	----	----	----
xylene, m+p-	179601-23-1	E611C	0.40	µg/L	<0.40	----	----	----	----	----
xylene, o-	95-47-6	E611C	0.30	µg/L	<0.30	----	----	----	----	----
xylenes, total	1330-20-7	E611C	0.50	µg/L	<0.50	----	----	----	----	----
Volatile Organic Compounds [THMs]										
bromodichloromethane	75-27-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----
bromoform	75-25-2	E611C	0.50	µg/L	<0.50	----	----	----	----	----
chloroform	67-66-3	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dibromochloromethane	124-48-1	E611C	0.50	µg/L	<0.50	----	----	----	----	----
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611C	1.0	%	97.0	----	----	----	----	----
difluorobenzene, 1,4-	540-36-3	E611C	1.0	%	103	----	----	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L	<250	----	----	----	----	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----	----	----	----	----
HEPHw	----	EC600A	250	µg/L	<250	----	----	----	----	----
LEPHw	----	EC600A	250	µg/L	<250	----	----	----	----	----
Hydrocarbons Surrogates										



Analytical Results

Sub-Matrix: Water					Client sample ID	New Landfill Aeration Pond	----	----	----	----
(Matrix: Water)					Client sampling date / time	11-Apr-2022 14:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A7623-001	Result	----	----	----	----
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%	95.7	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L	<0.090 ^{DLO}	----	----	----	----	----
acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	----	----	----	----	----
acridine	260-94-6	E641A	0.010	µg/L	0.033	----	----	----	----	----
anthracene	120-12-7	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	----	----	----	----	----
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	----	----	----	----	----
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L	<0.010	----	----	----	----	----
chrysene	218-01-9	E641A	0.010	µg/L	<0.010	----	----	----	----	----
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L	<0.0050	----	----	----	----	----
fluoranthene	206-44-0	E641A	0.010	µg/L	0.021	----	----	----	----	----
fluorene	86-73-7	E641A	0.010	µg/L	<0.010	----	----	----	----	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L	<0.010	----	----	----	----	----
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L	0.078	----	----	----	----	----
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L	0.137	----	----	----	----	----
naphthalene	91-20-3	E641A	0.050	µg/L	0.528	----	----	----	----	----
phenanthrene	85-01-8	E641A	0.020	µg/L	<0.020	----	----	----	----	----
pyrene	129-00-0	E641A	0.010	µg/L	0.021	----	----	----	----	----
quinoline	91-22-5	E641A	0.050	µg/L	0.277	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%	104	----	----	----	----	----
naphthalene-d8	1146-65-2	E641A	0.1	%	79.9	----	----	----	----	----
phenanthrene-d10	1517-22-2	E641A	0.1	%	95.6	----	----	----	----	----

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

CERTIFICATE OF ANALYSIS

Work Order : **VA22A7625**
Client : **Northwin Environmental Ltd.**
Contact : Mr Brian Fagan
Address : 315 - 1434 Ironwood Street
 Campbell River BC Canada V9W 5T5
Telephone : ----
Project : ----
PO : ----
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : VA2022NTHW1000001
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 4
Laboratory : Vancouver - Environmental
Account Manager : Sneha Sansare
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 12-Apr-2022 12:10
Date Analysis Commenced : 12-Apr-2022
Issue Date : 14-Apr-2022 15:52

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- General Comments
- Analytical Results

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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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Courtney Cox	Analyst	Inorganics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia



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Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
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-	No Unit
mg/L	milligrams per litre

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>: greater than.

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Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).



Analytical Results

Sub-Matrix: Water					Client sample ID	Sump Analysis	----	----	----	----
(Matrix: Water)										
Client sampling date / time					06-Apr-2022 14:30	----	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A7625-001	-----	-----	-----	-----	-----
					Result	----	----	----	----	----
Anions and Nutrients										
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	1290	----	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0352	----	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00195	----	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0150	----	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0436	----	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000040 ^{DLA}	----	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000100 ^{DLA}	----	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.031	----	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.000100 ^{DLM}	----	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	164	----	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000020 ^{DLA}	----	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00100 ^{DLA}	----	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00116	----	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00182	----	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.020 ^{DLA}	----	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000100 ^{DLA}	----	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0038	----	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	26.8	----	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	1.99	----	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.421	----	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00142	----	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.100 ^{DLA}	----	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.27	----	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00131	----	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.00281	----	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	7.77	----	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000020 ^{DLA}	----	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	640	----	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.626	----	----	----	----	----



Analytical Results

Sub-Matrix: Water					Client sample ID	Sump Analysis	----	----	----	----
(Matrix: Water)										
					Client sampling date / time	06-Apr-2022 14:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A7625-001	-----	-----	-----	-----	
					Result	----	----	----	----	
Dissolved Metals										
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	442	----	----	----	----	
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00040 ^{DLA}	----	----	----	----	
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000020 ^{DLA}	----	----	----	----	
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00020 ^{DLA}	----	----	----	----	
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00020 ^{DLA}	----	----	----	----	
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00060 ^{DLA}	----	----	----	----	
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00020 ^{DLA}	----	----	----	----	
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.0776	----	----	----	----	
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00208	----	----	----	----	
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0144	----	----	----	----	
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	0.00061	----	----	----	----	
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----	

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

CERTIFICATE OF ANALYSIS

Work Order : **VA22B2754**
Client : **Northwin Environmental Ltd.**
Contact : Mr Brian Fagan
Address : 315 - 1434 Ironwood Street
 Campbell River BC Canada V9W 5T5
Telephone : ----
Project : ----
PO : ----
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : VA2022NTHW1000001
No. of samples received : 2
No. of samples analysed : 2

Page : 1 of 6
Laboratory : Vancouver - Environmental
Account Manager : Sneha Sansare
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 08-Jun-2022 12:00
Date Analysis Commenced : 09-Jun-2022
Issue Date : 14-Jun-2022 15:33

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Asha Tauckoor	Laboratory Analyst	Organics, Burnaby, British Columbia
Benjamin Oke	Lab Assistant	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

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

Unit	Description
-	No Unit
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLCI	Detection Limit Raised: Chromatographic interference due to co-elution.



Analytical Results

Sub-Matrix: Water					Client sample ID	New Landfill Aeration Pond	New Landfill Holding Pond	----	----	----
(Matrix: Water)										
Client sampling date / time					07-Jun-2022 16:00	07-Jun-2022 16:00				
Analyte	CAS Number	Method	LOR	Unit	VA22B2754-001	VA22B2754-002	-----	-----	-----	-----
					Result	Result	----	----	----	----
Anions and Nutrients										
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	888	425	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0452	0.0865	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00184	0.00364	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00335	0.00653	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0173	0.0348	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000040 ^{DLA}	<0.000100 ^{DLA}	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000100 ^{DLA}	<0.000250 ^{DLA}	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	3.59	7.52	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000147	0.0000426	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	106	215	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000036	0.000070	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	0.00243	0.00456	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00322	0.00629	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00220	0.00302	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.499	0.650	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000125	<0.000250 ^{DLA}	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0040	0.0082	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	21.8	44.7	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.673	1.30	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000984	0.00197	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00677	0.0135	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.100 ^{DLA}	<0.250 ^{DLA}	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	22.2	45.4	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0144	0.0289	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000227	0.000347	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.96	9.65	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000020 ^{DLA}	<0.000050 ^{DLA}	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	149	301	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.740	1.46	----	----	----	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	New Landfill Aeration Pond	New Landfill Holding Pond	----	----	----
Client sampling date / time						07-Jun-2022 16:00	07-Jun-2022 16:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B2754-001	VA22B2754-002	-----	-----	-----	-----
					Result	Result	----	----	----	----
Dissolved Metals										
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	154	313	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00040 ^{DLA}	<0.00100 ^{DLA}	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000020 ^{DLA}	<0.000050 ^{DLA}	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00020 ^{DLA}	<0.00050 ^{DLA}	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00020 ^{DLA}	<0.00050 ^{DLA}	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00171	0.00283	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00020 ^{DLA}	<0.00050 ^{DLA}	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000258	0.000537	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00340	0.00639	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0110	0.0210	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	0.00059	0.00116	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----	----
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	----	----	----	----

Sub-Matrix: Water					Client sample ID	New Landfill Aeration Pond	New Landfill Holding Pond	----	----	----
(Matrix: Water)										
Client sampling date / time					07-Jun-2022 16:00	07-Jun-2022 16:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22B2754-001	VA22B2754-002	-----	-----	-----	
					Result	Result	----	----	----	
Volatile Organic Compounds [Drycleaning]										
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	----	----	----	
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	3.16	1.76	----	----	----	
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	%	90.2	98.4	----	----	----	
difluorobenzene, 1,4-	540-36-3	E611C	1.0	%	102	97.4	----	----	----	
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L	<250	<250	----	----	----	
EPH (C19-C32)	----	E601A	250	µg/L	<250	<250	----	----	----	
HEPHw	----	EC600A	250	µg/L	<250	<250	----	----	----	
LEPHw	----	EC600A	250	µg/L	<250	<250	----	----	----	
Hydrocarbons Surrogates										



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	New Landfill Aeration Pond	New Landfill Holding Pond	----	----	----
Client sampling date / time						07-Jun-2022 16:00	07-Jun-2022 16:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B2754-001	VA22B2754-002	-----	-----	-----	-----
					Result	Result	----	----	----	----
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%	101	106	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L	<0.040 ^{DLOI}	<0.050 ^{DLOI}	----	----	----	----
acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.020 ^{DLOI}	<0.020 ^{DLOI}	----	----	----	----
acridine	260-94-6	E641A	0.010	µg/L	0.017	0.010	----	----	----	----
anthracene	120-12-7	E641A	0.010	µg/L	<0.010	<0.010	----	----	----	----
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	<0.0050	----	----	----	----
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	<0.010	----	----	----	----
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	<0.015	----	----	----	----
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	<0.010	----	----	----	----
fluorene	86-73-7	E641A	0.010	µg/L	<0.010	<0.010	----	----	----	----
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	0.085	0.042	----	----	----	----
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L	0.129	0.082	----	----	----	----
naphthalene	91-20-3	E641A	0.050	µg/L	0.791	0.344	----	----	----	----
phenanthrene	85-01-8	E641A	0.020	µg/L	<0.020	<0.020	----	----	----	----
pyrene	129-00-0	E641A	0.010	µg/L	<0.010	<0.010	----	----	----	----
quinoline	91-22-5	E641A	0.050	µg/L	<0.060 ^{DLOI}	<0.050	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%	108	113	----	----	----	----
naphthalene-d8	1146-65-2	E641A	0.1	%	95.2	101	----	----	----	----
phenanthrene-d10	1517-22-2	E641A	0.1	%	107	105	----	----	----	----

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

CERTIFICATE OF ANALYSIS

Work Order : **VA22B5020**
Client : **Northwin Environmental Ltd.**
Contact : Mr Brian Fagan
Address : 315 - 1434 Ironwood Street
 Campbell River BC Canada V9W 5T5
Telephone : ----
Project : ----
PO : ----
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : VA2022NTHW1000001
No. of samples received : 2
No. of samples analysed : 2

Page : 1 of 4
Laboratory : Vancouver - Environmental
Account Manager : Sneha Sansare
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 01-Jul-2022 13:30
Date Analysis Commenced : 02-Jul-2022
Issue Date : 04-Jul-2022 22:57

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Organics, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia



General Comments

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

Unit	Description
-	No Unit
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

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

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Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.



According to Upland, this sample was actually collected from the Holding Pond

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Client sample ID

Sub-Matrix: Water (Matrix: Water)					Client sample ID	New Landfill aeration Pond - Supplemental Report VA22B2754-00 1	New Landfill aeration Pond - Supplemental Report VA22B2754-00 2	----	----	----
Client sampling date / time					01-Jul-2022	01-Jul-2022	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22B5020-001	VA22B5020-002	-----	-----	-----	
					Result	Result	---	---	---	
Anions and Nutrients										
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	328	----	----	----	----	
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	----	0.0600	----	----	----	
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	----	0.00092	----	----	----	
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	----	0.00408	----	----	----	
barium, dissolved	7440-39-3	E421	0.00010	mg/L	----	0.0226	----	----	----	
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	----	<0.000040 ^{DLA}	----	----	----	
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	----	<0.000100 ^{DLA}	----	----	----	
boron, dissolved	7440-42-8	E421	0.010	mg/L	----	2.56	----	----	----	
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	----	0.0000114	----	----	----	
calcium, dissolved	7440-70-2	E421	0.050	mg/L	----	77.4	----	----	----	
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	----	0.000048	----	----	----	
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	----	0.00223	----	----	----	
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	----	0.00200	----	----	----	
copper, dissolved	7440-50-8	E421	0.00020	mg/L	----	0.00310	----	----	----	
iron, dissolved	7439-89-6	E421	0.010	mg/L	----	0.048	----	----	----	
lead, dissolved	7439-92-1	E421	0.000050	mg/L	----	<0.000100 ^{DLA}	----	----	----	
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	----	0.0029	----	----	----	
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	----	13.4	----	----	----	
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	----	0.0698	----	----	----	
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	----	0.00123	----	----	----	
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	----	0.00535	----	----	----	
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	----	0.238	----	----	----	
potassium, dissolved	7440-09-7	E421	0.050	mg/L	----	18.5	----	----	----	
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	----	0.0118	----	----	----	
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	----	0.000252	----	----	----	
silicon, dissolved	7440-21-3	E421	0.050	mg/L	----	3.96	----	----	----	



Analytical Results

Sub-Matrix: Water

(Matrix: Water)

Client sample ID

					New Landfill aeration Pond - Supplemental Report VA22B2754-00 1	New Landfill aeration Pond - Supplemental Report VA22B2754-00 2	----	----	----
Client sampling date / time					01-Jul-2022	01-Jul-2022	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B5020-001	VA22B5020-002	-----	-----	-----
					Result	Result	----	----	----
Dissolved Metals									
silver, dissolved	7440-22-4	E421	0.000010	mg/L	----	<0.000020 ^{DLA}	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	----	78.0	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	----	0.473	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	----	113	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	----	<0.00040 ^{DLA}	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	----	<0.000020 ^{DLA}	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	----	<0.00020 ^{DLA}	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	----	0.00026	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	----	<0.00060 ^{DLA}	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	----	0.00024	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	----	0.000238	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	----	0.00322	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	----	0.0224	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	----	0.00063	----	----	----
dissolved metals filtration location	----	EP421	-	-	----	Field	----	----	----
Polycyclic Aromatic Hydrocarbons									
quinoline	91-22-5	E641A	0.050	µg/L	0.079	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates									
chrysene-d12	1719-03-5	E641A	0.1	%	99.8	----	----	----	----
naphthalene-d8	1146-65-2	E641A	0.1	%	98.8	----	----	----	----
phenanthrene-d10	1517-22-2	E641A	0.1	%	96.0	----	----	----	----

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

CERTIFICATE OF ANALYSIS

Work Order : **VA22B7883**
Client : **Northwin Environmental Ltd.**
Contact : Mr Brian Fagan
Address : 315 - 1434 Ironwood Street
 Campbell River BC Canada V9W 5T5
Telephone : ----
Project : ----
PO : ----
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : VA2022NTHW1000001
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 3
Laboratory : Vancouver - Environmental
Account Manager : Sneha Sansare
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 03-Aug-2022 18:00
Date Analysis Commenced : 03-Aug-2022
Issue Date : 04-Aug-2022 17:58

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia



General Comments

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<i>Unit</i>	<i>Description</i>
µg/L	micrograms per litre

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Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLQ	Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.



Analytical Results

Sub-Matrix: Water					Client sample ID	New Landfill Aeration Pond	----	----	----	----
(Matrix: Water)										
					Client sampling date / time	29-Jul-2022 08:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B7883-001	-----	-----	-----	-----	-----
					Result	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
quinoline	91-22-5	E641A-L	0.010	µg/L	<0.025 ^{DLQ}	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A-L	0.1	%	101	----	----	----	----	----
naphthalene-d8	1146-65-2	E641A-L	0.1	%	100	----	----	----	----	----
phenanthrene-d10	1517-22-2	E641A-L	0.1	%	105	----	----	----	----	----

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CERTIFICATE OF ANALYSIS

Work Order	: VA22C6839	Page	: 1 of 7
Client	: Northwin Environmental Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Mr Brian Fagan	Account Manager	: Sneha Sansare
Address	: 315 - 1434 Ironwood Street Campbell River BC Canada V9W 5T5	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 04-Nov-2022 11:30
PO	: ----	Date Analysis Commenced	: 04-Nov-2022
C-O-C number	: ----	Issue Date	: 07-Nov-2022 12:30
Sampler	: ----		
Site	: ----		
Quote number	: VA2022NTHW1000001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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- Surrogate Control Limits

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Signatories	Position	Laboratory Department
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia



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Qualifiers

Qualifier	Description
DLQ	Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.



Analytical Results

Sub-Matrix: Water					Client sample ID	New Landfill Holding Pond Nov 02 2022	----	----	----	----
(Matrix: Water)					Client sampling date / time	02-Nov-2022 16:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C6839-001	Result	----	----	----	----
Anions and Nutrients										
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	970	----	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0375	----	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00259	----	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00720	----	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0202	----	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	----	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	----	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	11.2	----	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000434	----	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	142	----	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000080	----	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	0.00234	----	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00240	----	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00684	----	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.173	----	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000228	----	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0082	----	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	56.4	----	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.933	----	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00204	----	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.0128	----	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.060	----	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	55.4	----	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0322	----	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000380	----	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	8.13	----	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	----	----	----	----	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	New Landfill Holding Pond Nov 02 2022	----	----	----	----
Client sampling date / time						02-Nov-2022 16:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C6839-001	Result	----	----	----	----
Dissolved Metals										
sodium, dissolved	7440-23-5	E421	0.050	mg/L	429	----	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	1.49	----	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	371	----	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	----	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000017	----	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	----	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00060	----	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00096	----	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.00047	----	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000542	----	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.0134	----	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0442	----	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	0.00083	----	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----	----
Volatile Organic Compounds										
chlorobenzene	108-90-7	E611C	0.50	µg/L	<0.50	----	----	----	----	----
chloromethane	74-87-3	E611C	5.0	µg/L	<5.0	----	----	----	----	----
dichlorobenzene, 1,2-	95-50-1	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichlorobenzene, 1,3-	541-73-1	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichlorobenzene, 1,4-	106-46-7	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloropropane, 1,2-	78-87-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloropropylene, cis+trans-1,3-	542-75-6	E611C	0.75	µg/L	<0.75	----	----	----	----	----
dichloropropylene, cis-1,3-	10061-01-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----
tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.50	µg/L	<0.50	----	----	----	----	----
tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.20	µg/L	<0.20	----	----	----	----	----
trichloroethane, 1,1,2-	79-00-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----
trichlorofluoromethane	75-69-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----
Volatile Organic Compounds [Drycleaning]										
carbon tetrachloride	56-23-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	New Landfill Holding Pond Nov 02 2022	----	----	----	----
Client sampling date / time						02-Nov-2022 16:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C6839-001	Result	----	----	----	----
Volatile Organic Compounds [Drycleaning]										
chloroethane	75-00-3	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloroethane, 1,1-	75-34-3	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloroethane, 1,2-	107-06-2	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloroethylene, 1,1-	75-35-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloroethylene, cis-1,2-	156-59-2	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloroethylene, trans-1,2-	156-60-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dichloromethane	75-09-2	E611C	1.0	µg/L	<1.0	----	----	----	----	----
dichloropropylene, trans-1,3-	10061-02-6	E611C	0.50	µg/L	<0.50	----	----	----	----	----
tetrachloroethylene	127-18-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----
trichloroethane, 1,1,1-	71-55-6	E611C	0.50	µg/L	<0.50	----	----	----	----	----
trichloroethylene	79-01-6	E611C	0.50	µg/L	<0.50	----	----	----	----	----
vinyl chloride	75-01-4	E611C	0.40	µg/L	<0.40	----	----	----	----	----
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611C	0.50	µg/L	<0.50	----	----	----	----	----
ethylbenzene	100-41-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----
styrene	100-42-5	E611C	0.50	µg/L	<0.50	----	----	----	----	----
toluene	108-88-3	E611C	0.40	µg/L	<0.40	----	----	----	----	----
xylene, m+p-	179601-23-1	E611C	0.40	µg/L	<0.40	----	----	----	----	----
xylene, o-	95-47-6	E611C	0.30	µg/L	<0.30	----	----	----	----	----
xylenes, total	1330-20-7	E611C	0.50	µg/L	<0.50	----	----	----	----	----
Volatile Organic Compounds [THMs]										
bromodichloromethane	75-27-4	E611C	0.50	µg/L	<0.50	----	----	----	----	----
bromoform	75-25-2	E611C	0.50	µg/L	<0.50	----	----	----	----	----
chloroform	67-66-3	E611C	0.50	µg/L	<0.50	----	----	----	----	----
dibromochloromethane	124-48-1	E611C	0.50	µg/L	<0.50	----	----	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L	<250	----	----	----	----	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----	----	----	----	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	New Landfill Holding Pond Nov 02 2022	----	----	----	----
Client sampling date / time						02-Nov-2022 16:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C6839-001	Result	----	----	----	----
Hydrocarbons										
HEPHw	----	EC600A	250	µg/L	<250	----	----	----	----	----
LEPHw	----	EC600A	250	µg/L	<250	----	----	----	----	----
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%	106	----	----	----	----	----
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611C	1.0	%	86.0	----	----	----	----	----
difluorobenzene, 1,4-	540-36-3	E611C	1.0	%	94.5	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L	<0.040 ^{DLO}	----	----	----	----	----
acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	----	----	----	----	----
acridine	260-94-6	E641A	0.010	µg/L	<0.010	----	----	----	----	----
anthracene	120-12-7	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	----	----	----	----	----
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	----	----	----	----	----
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L	<0.010	----	----	----	----	----
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L	<0.010	----	----	----	----	----
chrysene	218-01-9	E641A	0.010	µg/L	<0.010	----	----	----	----	----
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L	<0.0050	----	----	----	----	----
fluoranthene	206-44-0	E641A	0.010	µg/L	<0.010	----	----	----	----	----
fluorene	86-73-7	E641A	0.010	µg/L	<0.010	----	----	----	----	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L	<0.010	----	----	----	----	----
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L	0.051	----	----	----	----	----
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L	0.132	----	----	----	----	----
naphthalene	91-20-3	E641A	0.050	µg/L	0.324	----	----	----	----	----
phenanthrene	85-01-8	E641A	0.020	µg/L	<0.020	----	----	----	----	----
pyrene	129-00-0	E641A	0.010	µg/L	<0.010	----	----	----	----	----
quinoline	91-22-5	E641A	0.050	µg/L	<0.050	----	----	----	----	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	New Landfill Holding Pond Nov 02 2022	----	----	----	----
					Client sampling date / time	02-Nov-2022 16:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C6839-001	-----	-----	-----	-----	
					Result	----	----	----	----	
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%	121	----	----	----	----	
naphthalene-d8	1146-65-2	E641A	0.1	%	95.3	----	----	----	----	
phenanthrene-d10	1517-22-2	E641A	0.1	%	115	----	----	----	----	

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

Facility ID	Landfill ID	Sample Name	Location	Date	Time	Type	Matrix	Parent Sample Name	WaterDepth	DepthUnit	Dry/YesNo	Notes	Temperature	Temperature Unit	Field pH (h.s.)	ORP	ORP units	Conductivity	Conductivity Unit	Turbidity (NTU)	Dissolved Oxygen (DO)	DO Units	TDS	TDS Units
1088877000	NEW	WG-11222680-010422-MJ-01	MW4A-16	04/01/2022	11:10	N	WG		mBTOR	6.986	N	Clear, no odour	8.30	deg C	6.78	231	millivolts	159	uS/cm	1.3		163	mg/L	
1088877000	NEW	WG-11222680-010422-MJ-02	MW4B-16	04/01/2022	11:20	N	WG		mBTOR	7.164	N	Clear, no odour	9.43	deg C	6.85	205	millivolts	165	uS/cm	8.4		107	mg/L	
1088877000	NEW	WG-11222680-010422-MJ-03	MW2A-16	04/01/2022	12:40	N	WG		mBTOR	17.408	N	Clear, no odour	11.06	deg C	7.73	232	millivolts	65	uS/cm	14.3		42	mg/L	
1088877000	NEW	WG-11222680-010422-MJ-04	MW2-14	04/01/2022	12:20	N	WG		mBTOR	17.440	N	Clear, no odour	10.40	deg C	7.13	216	millivolts	116	uS/cm	11.5		75	mg/L	
1088877000	NEW	WG-11222680-010422-MJ-05	Field Blank	04/01/2022	12:30	N	WG					Upland Field Blank												
1088877000	NEW	WG-11222680-010422-MJ-06	MW1-14	04/01/2022	13:25	N	WG		mBTOR	9.702	N	Clear	14.39	deg C	7.21	207	millivolts	106	uS/cm	9.2		69	mg/L	
1088877000	NEW	WG-11222680-010422-MJ-07	MW1-159	04/01/2022	14:20	N	WG		mBTOR	48.383	N	Very turbid sample. Murky brown, no odour	12.62	deg C	7.21	222	millivolts	153	uS/cm	994		100	mg/L	
1088877000	NEW	WG-11222680-010422-MJ-08	MW10-17	04/01/2022	15:30	N	WG		mBTOR	45.601	N	Murky to clear, no odour	11.48	deg C	7.75	215	millivolts	129	uS/cm	9.7		84	mg/L	
1088877000	NEW	WG-11222680-010422-MJ-09	MW5-17	04/01/2022	17:20	N	WG		mBTOR	7.624	N	Murky brown, no odour. Used hydroblit to purge, use per pump in future. Slow recharge, approx 10m every 10 seconds. Came back for sample. Either bailer or per pump well.	8.67	deg C	7.10	232	millivolts	449	uS/cm	0.11		232	mg/L	
1088877000	NEW	WG-11222680-010422-MJ-10	MW5-17	04/01/2022	18:10	N	WG		mBTOR	26.367	N		Clear, no odour. Tubing low, bring something to fish out with next time.	8.15	deg C	7.86	225	millivolts	56	uS/cm	10.5		36	mg/L
1088877000	NEW	WS-11222680-010422-MJ-01	Rico Lake	04/01/2022	16:50	N	WS					Lake, little flow, rocky shoreline, veg on shoreline (bushes, trees, etc), clear, no odour, dirt bottom	7.18	deg C	7.53	235	millivolts	50	uS/cm	6.4	24.09	mg/L	33	mg/L
1088877000	NEW	WS-11222680-010422-MJ-02	McIvor Lake	04/01/2022	16:20	N	WS					Clear, no odour. Sandy shoreline w/ small pebbles mixed.	7.14	deg C	7.80	231	millivolts	43	uS/cm	0.7	10.50	mg/L	28	mg/L
1088877000	NEW	WL-11222680-010422-MJ-01	SOG-21	04/01/2022	16:10	N	WL	WL-11222680-010422-MJ-01				Black, strong odour, white bubbles	10.20	deg C	6.69	-150	millivolts	4530	uS/cm	275	8.52	mg/L	2900	mg/L
1088877000	NEW	WL-11222680-010422-MJ-02	SOG-21	04/01/2022	16:20	FO	WL					Leachate Field Duplicate	10.20	deg C	6.69	-150	millivolts	4530	uS/cm	275	8.52	mg/L	2900	mg/L
1088877000	NEW	TLIP-010422	TLIP	04/01/2022	7:50	N	WL					TLIP was not discharging treated leachate into the pond. No sample needed.												
1088877000	NEW	East Surface Water Ditch-010422	East SW Ditch	04/01/2022	7:00	N	WS					Ditch Dry												
1088877000	NEW	West Surface Water Ditch-010422	West SW Ditch	04/01/2022	7:00	N	WS					Ditch Dry												
1088877000	NEW	LS1-010422	LS1	04/01/2022	7:00	N	WG					Dry												
1088877000	NEW	LS2-010422	LS2	04/01/2022	7:00	N	WG					Dry												



Your P.O. #: 735-002640
 Your Project #: 11222680-3-2
 Site Location: UPLAND EMP
 Your C.O.C. #: 660946-01-01, 660946-02-01

Attention: 11222680 Distribution

GHD Limited
 455 PHILLIP STREET
 WATERLOO, ON
 CANADA N2L 3X2

Report Date: 2022/07/06
 Report #: R3195908
 Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C221453

Received: 2022/04/02, 13:48

Sample Matrix: Water
 # Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	14	N/A	2022/04/04	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	2	2022/04/04	2022/04/09	BBY6SOP-00045	SM 23 5210 B m
Chloride/Sulphate by Auto Colourimetry	14	N/A	2022/04/07	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO ₄ -E m
COD by Colorimeter	2	N/A	2022/04/05	BBY6SOP-00024	SM 23 5220 D m
Conductivity @25C	14	N/A	2022/04/04	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H ₂ S) (1)	14	N/A	2022/04/06		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	9	N/A	2022/04/07	BBY WI-00033	Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	5	N/A	2022/04/08	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO ₃) (2)	4	N/A	2022/04/07	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	10	N/A	2022/04/05	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	4	N/A	2022/04/07	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (3)	10	2022/04/05	2022/04/05	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	4	2022/04/04	2022/04/04	AB SOP-00084	BCMOE BCLM Oct2013 m
ICP-OES Dissolved Metals in Water (3)	4	N/A	2022/04/07	BBY7SOP-00018	EPA 6010d m
EPH in Water when PAH required	12	2022/04/06	2022/04/07	BBY8SOP-00029	BCMOE BCLM Sep2017 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	10	N/A	2022/04/05	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (3)	10	N/A	2022/04/04	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	4	2022/04/02	2022/04/07	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	4	2022/04/04	2022/04/06	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	14	N/A	2022/04/11	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate + Nitrite (N)	14	N/A	2022/04/02	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrite (N) by CFA	14	N/A	2022/04/02	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	14	N/A	2022/04/02	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	6	2022/04/06	2022/04/06	BBY8SOP-00021	BCMOE BCLM Jul2017m
PAH in Water by GC/MS (SIM)	6	2022/04/06	2022/04/07	BBY8SOP-00021	BCMOE BCLM Jul2017m
Filter and HNO ₃ Preserve for Metals	10	N/A	2022/04/02	BBY7 WI-00004	SM 23 3030B m
Filter and HNO ₃ Preserve for Metals	4	N/A	2022/04/04	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (4)	14	N/A	2022/04/02	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	14	N/A	2022/04/06	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Dissolved Solids (Filt. Residue)	2	2022/04/05	2022/04/06	BBY6SOP-00033	SM 23 2540 C m



Your P.O. #: 735-002640
 Your Project #: 11222680-3-2
 Site Location: UPLAND EMP
 Your C.O.C. #: 660946-01-01, 660946-02-01

Attention: 11222680 Distribution

GHD Limited
 455 PHILLIP STREET
 WATERLOO, ON
 CANADA N2L 3X2

Report Date: 2022/07/06
 Report #: R3195908
 Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C221453

Received: 2022/04/02, 13:48

Sample Matrix: Water
 # Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Dissolved Solids (Filt. Residue)	12	2022/04/06	2022/04/07	BBY6SOP-00033	SM 23 2540 C m
EPH less PAH in Water by GC/FID (5)	12	N/A	2022/04/08	BBY WI-00033	Auto Calc
Total Suspended Solids (NFR)	2	2022/04/06	2022/04/07	BBY6SOP-00034	SM 23 2540 D m
Field pH	14	N/A	2022/04/07		
Field Temperature	14	N/A	2022/04/07		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).

(3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.

(4) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

(5) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)



Your P.O. #: 735-002640
Your Project #: 11222680-3-2
Site Location: UPLAND EMP
Your C.O.C. #: 660946-01-01, 660946-02-01

Attention: 11222680 Distribution

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Report Date: 2022/07/06
Report #: R3195908
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C221453

Received: 2022/04/02, 13:48

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Thomas Pinchin, Project Solutions Representative

Email: Thomas.Pinchin@bureauveritas.com

Phone# (604) 734 7276

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.



RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID			AQZ066	AQZ066	AQZ067			
Sampling Date			2022/04/01 11:10	2022/04/01 11:10	2022/04/01 11:20			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-01	WG-11222680-010422 -MJ-01 Lab-Dup	WG-11222680-010422 -MJ-02	RDL	MDL	QC Batch

ANIONS

Nitrite (N)	mg/L	1	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A542262

Calculated Parameters

Filter and HNO3 Preservation	N/A	-	FIELD	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	10	1.78	N/A	1.76	0.020	N/A	A542255
Sulphide (as H2S)	mg/L	0.05	<0.0020	N/A	0.0043	0.0020	N/A	A542149

Field Parameters

Field pH	pH	-	6.78	N/A	6.85	N/A	N/A	ONSITE
Field Temperature	°C	-	8.90	N/A	9.43	N/A	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	-	180	N/A	170	2.0	N/A	A544363
Total Dissolved Solids	mg/L	-	170	N/A	120	10	N/A	A545041

Anions

Alkalinity (PP as CaCO3)	mg/L	-	<1.0	N/A	<1.0	1.0	N/A	A544362
Alkalinity (Total as CaCO3)	mg/L	-	56	N/A	55	1.0	N/A	A544362
Bicarbonate (HCO3)	mg/L	-	68	N/A	67	1.0	N/A	A544362
Carbonate (CO3)	mg/L	-	<1.0	N/A	<1.0	1.0	N/A	A544362
Hydroxide (OH)	mg/L	-	<1.0	N/A	<1.0	1.0	N/A	A544362
Total Sulphide	mg/L	-	<0.0018	N/A	0.0041	0.0018	N/A	A544948
Chloride (Cl)	mg/L	250	7.3	N/A	6.9	1.0	N/A	A546895
Sulphate (SO4)	mg/L	500	15	N/A	15	1.0	N/A	A546895

Nutrients

Total Ammonia (N)	mg/L	-	<0.015	N/A	<0.015	0.015	0.0040	A548996
Orthophosphate (P)	mg/L	-	0.0092	0.0082	0.0072	0.0030	0.0030	A542260
Nitrate plus Nitrite (N)	mg/L	-	1.78	1.78	1.76	0.020	0.020	A542261

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID			AQZ068	AQZ069	AQZ070			
Sampling Date			2022/04/01 12:40	2022/04/01 12:20	2022/04/01 12:30			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-03	WG-11222680-010422 -MJ-04	WG-11222680-010422 -MJ-05	RDL	MDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	1	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A542262
Calculated Parameters								
Filter and HNO3 Preservation	N/A	-	FIELD	FIELD	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	10	0.090	0.428	<0.020	0.020	N/A	A542255
Sulphide (as H2S)	mg/L	0.05	0.011	0.011	<0.0020	0.0020	N/A	A542149
Field Parameters								
Field pH	pH	-	7.73	7.13	7.13	N/A	N/A	ONSITE
Field Temperature	°C	-	11.06	10.40	10.40	N/A	N/A	ONSITE
Misc. Inorganics								
Conductivity	uS/cm	-	72	120	<2.0	2.0	N/A	A544363
Total Dissolved Solids	mg/L	-	40	86	<10	10	N/A	A545041
Anions								
Alkalinity (PP as CaCO3)	mg/L	-	<1.0	<1.0	<1.0	1.0	N/A	A544362
Alkalinity (Total as CaCO3)	mg/L	-	32	45	<1.0	1.0	N/A	A544362
Bicarbonate (HCO3)	mg/L	-	40	55	<1.0	1.0	N/A	A544362
Carbonate (CO3)	mg/L	-	<1.0	<1.0	<1.0	1.0	N/A	A544362
Hydroxide (OH)	mg/L	-	<1.0	<1.0	<1.0	1.0	N/A	A544362
Total Sulphide	mg/L	-	0.0099	0.010	<0.0018	0.0018	N/A	A544948
Chloride (Cl)	mg/L	250	<1.0	4.8	<1.0	1.0	N/A	A546895
Sulphate (SO4)	mg/L	500	2.6	6.0	<1.0	1.0	N/A	A546895
Nutrients								
Total Ammonia (N)	mg/L	-	<0.015	<0.015	0.035	0.015	0.0040	A548996
Orthophosphate (P)	mg/L	-	0.027	0.0037	<0.0030	0.0030	0.0030	A542260
Nitrate plus Nitrite (N)	mg/L	-	0.090	0.428	<0.020	0.020	0.020	A542261
No Fill	No Exceedance Exceeds 1 criteria policy/level Exceeds both criteria/levels							
Grey								
Black								
RDL = Reportable Detection Limit N/A = Not Applicable								



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID			AQZ071			AQZ072			
Sampling Date			2022/04/01 13:25			2022/04/01 14:20			
COC Number			660946-01-01			660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-06	RDL	QC Batch	WG-11222680-010422 -MJ-07	RDL	MDL	QC Batch

ANIONS									
Nitrite (N)	mg/L	1	<0.0050	0.0050	A542262	<0.0050	0.0050	0.0050	A542262
Calculated Parameters									
Filter and HNO3 Preservation	N/A	-	FIELD	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	10	0.553	0.020	A542255	0.590	0.020	N/A	A542255
Sulphide (as H2S)	mg/L	0.05	<0.0020	0.0020	A542149	0.074	0.0080	N/A	A542149
Field Parameters									
Field pH	pH	-	7.21	N/A	ONSITE	7.21	N/A	N/A	ONSITE
Field Temperature	°C	-	14.39	N/A	ONSITE	12.62	N/A	N/A	ONSITE
Misc. Inorganics									
Conductivity	uS/cm	-	110	2.0	A544363	160	2.0	N/A	A544363
Total Dissolved Solids	mg/L	-	62	10	A545041	110	10	N/A	A545041
Anions									
Alkalinity (PP as CaCO3)	mg/L	-	<1.0	1.0	A544362	<1.0	1.0	N/A	A544362
Alkalinity (Total as CaCO3)	mg/L	-	39	1.0	A544362	64	1.0	N/A	A544362
Bicarbonate (HCO3)	mg/L	-	48	1.0	A544362	78	1.0	N/A	A544362
Carbonate (CO3)	mg/L	-	<1.0	1.0	A544362	<1.0	1.0	N/A	A544362
Hydroxide (OH)	mg/L	-	<1.0	1.0	A544362	<1.0	1.0	N/A	A544362
Total Sulphide	mg/L	-	<0.0018	0.0018	A544948	0.069 (1)	0.0072	N/A	A544948
Chloride (Cl)	mg/L	250	7.3	1.0	A546895	7.2	1.0	N/A	A546895
Sulphate (SO4)	mg/L	500	2.7	1.0	A546895	6.4	1.0	N/A	A546895
Nutrients									
Total Ammonia (N)	mg/L	-	0.053	0.015	A548996	0.14	0.015	0.0040	A548996
Orthophosphate (P)	mg/L	-	0.0061	0.0030	A542260	0.010	0.0030	0.0030	A542260
Nitrate plus Nitrite (N)	mg/L	-	0.553	0.020	A542261	0.590	0.020	0.020	A542261

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels
RDL = Reportable Detection Limit	
N/A = Not Applicable	
(1) Detection limits raised due to sample matrix.	



RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID			AQZ072			AQZ073			
Sampling Date			2022/04/01 14:20			2022/04/01 15:30			
COC Number			660946-01-01			660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-07 Lab-Dup	RDL	QC Batch	WG-11222680-010422 -MJ-08	RDL	MDL	QC Batch

ANIONS

Nitrite (N)	mg/L	1	N/A	0.0050	A542262	<0.0050	0.0050	0.0050	A542262

Calculated Parameters

Filter and HNO3 Preservation	N/A	-	N/A	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	10	N/A	0.020	A542255	0.142	0.020	N/A	A542255
Sulphide (as H2S)	mg/L	0.05	N/A	0.0080	A542149	<0.0020	0.0020	N/A	A542149

Field Parameters

Field pH	pH	-	N/A	N/A	ONSITE	7.75	N/A	N/A	ONSITE
Field Temperature	°C	-	N/A	N/A	ONSITE	11.48	N/A	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	-	N/A	2.0	A544363	130	2.0	N/A	A544363
Total Dissolved Solids	mg/L	-	N/A	10	A545041	76	10	N/A	A545041

Anions

Alkalinity (PP as CaCO3)	mg/L	-	N/A	1.0	A544362	<1.0	1.0	N/A	A544362
Alkalinity (Total as CaCO3)	mg/L	-	N/A	1.0	A544362	58	1.0	N/A	A544362
Bicarbonate (HCO3)	mg/L	-	N/A	1.0	A544362	71	1.0	N/A	A544362
Carbonate (CO3)	mg/L	-	N/A	1.0	A544362	<1.0	1.0	N/A	A544362
Hydroxide (OH)	mg/L	-	N/A	1.0	A544362	<1.0	1.0	N/A	A544362
Total Sulphide	mg/L	-	N/A	0.0072	A544948	<0.0018	0.0018	N/A	A544948
Chloride (Cl)	mg/L	250	7.0	1.0	A546897	3.6	1.0	N/A	A546895
Sulphate (SO4)	mg/L	500	5.4	1.0	A546897	4.2	1.0	N/A	A546895

Nutrients

Total Ammonia (N)	mg/L	-	N/A	0.015	A548996	<0.015	0.015	0.0040	A548996
Orthophosphate (P)	mg/L	-	N/A	0.0030	A542260	0.012	0.0030	0.0030	A542260
Nitrate plus Nitrite (N)	mg/L	-	N/A	0.020	A542261	0.142	0.020	0.020	A542261

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID			AQZ074		AQZ075			
Sampling Date			2022/04/01 17:20		2022/04/01 18:10			
COC Number			660946-01-01		660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-09	RDL	WG-11222680-010422 -MJ-10	RDL	MDL	QC Batch

ANIONS								
Nitrite (N)	mg/L	1	<0.0050	0.0050	<0.0050	0.0050	0.0050	A542262
Calculated Parameters								
Filter and HNO3 Preservation	N/A	-	FIELD	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	10	0.583	0.020	0.038	0.020	N/A	A542255
Sulphide (as H2S)	mg/L	0.05	0.050	0.010	<0.0020	0.0020	N/A	A542149
Field Parameters								
Field pH	pH	-	7.10	N/A	7.86	N/A	N/A	ONSITE
Field Temperature	°C	-	8.67	N/A	8.15	N/A	N/A	ONSITE
Misc. Inorganics								
Conductivity	uS/cm	-	490	2.0	61	2.0	N/A	A544363
Total Dissolved Solids	mg/L	-	290	10	44	10	N/A	A545041
Anions								
Alkalinity (PP as CaCO3)	mg/L	-	<1.0	1.0	<1.0	1.0	N/A	A544362
Alkalinity (Total as CaCO3)	mg/L	-	95	1.0	27	1.0	N/A	A544362
Bicarbonate (HCO3)	mg/L	-	120	1.0	33	1.0	N/A	A544362
Carbonate (CO3)	mg/L	-	<1.0	1.0	<1.0	1.0	N/A	A544362
Hydroxide (OH)	mg/L	-	<1.0	1.0	<1.0	1.0	N/A	A544362
Total Sulphide	mg/L	-	0.047 (1)	0.0090	<0.0018	0.0018	N/A	A544948
Chloride (Cl)	mg/L	250	94	1.0	<1.0	1.0	N/A	A546895
Sulphate (SO4)	mg/L	500	5.8	1.0	2.4	1.0	N/A	A546895
Nutrients								
Total Ammonia (N)	mg/L	-	0.017	0.015	<0.015	0.015	0.0040	A548996
Orthophosphate (P)	mg/L	-	0.0035	0.0030	0.0056	0.0030	0.0030	A542260
Nitrate plus Nitrite (N)	mg/L	-	0.583	0.020	0.038	0.020	0.020	A542261

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels
RDL = Reportable Detection Limit	
N/A = Not Applicable	
(1) Detection limits raised due to sample matrix.	



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID			AQZ078	AQZ079	AQZ079			
Sampling Date			2022/04/01 16:50	2022/04/01 18:20	2022/04/01 18:20			
COC Number			660946-02-01	660946-02-01	660946-02-01			
	UNITS	LOW	WS-11222680-010422- MJ-01	WS-11222680-010422- MJ-02	WS-11222680-010422- MJ-02 Lab-Dup	RDL	MDL	QC Batch

ANIONS

Nitrite (N)	mg/L	1	<0.0050	<0.0050	N/A	0.0050	0.0050	A542262

Calculated Parameters

Filter and HNO3 Preservation	N/A	-	LAB	LAB	N/A	N/A	N/A	A542928
Dissolved Hardness (CaCO3)	mg/L	-	15.1	21.1	N/A	0.50	0.50	A542251
Nitrate (N)	mg/L	10	<0.020	0.179	N/A	0.020	N/A	A542255
Sulphide (as H2S)	mg/L	0.05	<0.0020	<0.0020	N/A	0.0020	N/A	A542149

Field Parameters

Field pH	pH	-	7.53	7.80	N/A	N/A	N/A	ONSITE
Field Temperature	°C	-	7.18	7.14	N/A	N/A	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	-	53	47	48	2.0	N/A	A544372
Total Dissolved Solids	mg/L	-	28	40	N/A	10	N/A	A545041

Anions

Alkalinity (PP as CaCO3)	mg/L	-	<1.0	<1.0	<1.0	1.0	N/A	A544371
Alkalinity (Total as CaCO3)	mg/L	-	14	20	18	1.0	N/A	A544371
Bicarbonate (HCO3)	mg/L	-	18	24	22	1.0	N/A	A544371
Carbonate (CO3)	mg/L	-	<1.0	<1.0	<1.0	1.0	N/A	A544371
Hydroxide (OH)	mg/L	-	<1.0	<1.0	<1.0	1.0	N/A	A544371
Total Sulphide	mg/L	-	<0.0018	<0.0018	N/A	0.0018	N/A	A544948
Chloride (Cl)	mg/L	250	6.1	<1.0	N/A	1.0	N/A	A546895
Sulphate (SO4)	mg/L	500	1.1	2.2	N/A	1.0	N/A	A546895

Nutrients

Total Ammonia (N)	mg/L	-	<0.015	<0.015	N/A	0.015	0.0040	A548996
Orthophosphate (P)	mg/L	-	<0.0030	<0.0030	N/A	0.0030	0.0030	A542260
Nitrate plus Nitrite (N)	mg/L	-	<0.020	0.179	N/A	0.020	0.020	A542261

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels
RDL = Reportable Detection Limit	
Lab-Dup = Laboratory Initiated Duplicate	
N/A = Not Applicable	



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID			AQZ080	AQZ081			
Sampling Date			2022/04/01 16:10	2022/04/01 16:20			
COC Number			660946-02-01	660946-02-01			
	UNITS	LOW	WL-11222680-010422-MJ-01	WL-11222680-010422-MJ-02	RDL	MDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	1	0.055 (1)	0.057 (1)	0.050	0.050	A542262
Calculated Parameters							
Filter and HNO3 Preservation	N/A	-	LAB	LAB	N/A	N/A	A542928
Dissolved Hardness (CaCO3)	mg/L	-	2130	2220	0.50	0.50	A542251
Nitrate (N)	mg/L	10	<0.20	<0.20	0.20	N/A	A542255
Sulphide (as H2S)	mg/L	0.05	11	15	0.19	N/A	A542149
Demand Parameters							
Biochemical Oxygen Demand	mg/L	-	550	580	50	N/A	A543288
Chemical Oxygen Demand	mg/L	-	1320	1310	10	10	A543842
Field Parameters							
Field pH	pH	-	6.69	6.69	N/A	N/A	ONSITE
Field Temperature	°C	-	10.20	10.20	N/A	N/A	ONSITE
Misc. Inorganics							
Conductivity	uS/cm	-	4600	4600	2.0	N/A	A544372
Total Dissolved Solids	mg/L	-	4100 (2)	4900 (2)	17	N/A	A544369
Total Suspended Solids	mg/L	-	110 (2)	100 (2)	2.5	N/A	A545018
Anions							
Alkalinity (PP as CaCO3)	mg/L	-	<1.0	<1.0	1.0	N/A	A544371
Alkalinity (Total as CaCO3)	mg/L	-	1400	1500	1.0	N/A	A544371
Bicarbonate (HCO3)	mg/L	-	1800	1800	1.0	N/A	A544371
Carbonate (CO3)	mg/L	-	<1.0	<1.0	1.0	N/A	A544371
Hydroxide (OH)	mg/L	-	<1.0	<1.0	1.0	N/A	A544371
Total Sulphide	mg/L	-	10 (3)	14 (3)	0.18	N/A	A544948
Chloride (Cl)	mg/L	250	190 (1)	190 (1)	10	N/A	A546897
Sulphate (SO4)	mg/L	500	1200	1200	10	N/A	A546897
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) RDL raised due to sample matrix interference.							
(2) RDL raised due to high concentration of solids in the sample.							
(3) Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.							
Detection limits raised due to dilution to bring analyte within the calibrated range.							



RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID			AQZ080	AQZ081			
Sampling Date			2022/04/01 16:10	2022/04/01 16:20			
COC Number			660946-02-01	660946-02-01			
	UNITS	LOW	WL-11222680-010422-MJ-01	WL-11222680-010422-MJ-02	RDL	MDL	QC Batch
Nutrients							
Total Ammonia (N)	mg/L	-	50	51	0.75	0.20	A548996
Orthophosphate (P)	mg/L	-	0.021	0.021	0.0030	0.0030	A542260
Nitrate plus Nitrite (N)	mg/L	-	<0.20 (1)	<0.20 (1)	0.20	0.20	A542261
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							
(1) RDL raised due to sample matrix interference.							



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID			AQZ066	AQZ067	AQZ068			
Sampling Date			2022/04/01 11:10	2022/04/01 11:20	2022/04/01 12:40			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-01	WG-11222680-010422 -MJ-02	WG-11222680-010422 -MJ-03	RDL	MDL	QC Batch
Polycyclic Aromatics								
Naphthalene	ug/L	80	<0.10	<0.10	<0.10	0.10	0.050	A545443
Acenaphthene	ug/L	250	<0.050	<0.050	<0.050	0.050	0.050	A545443
Fluorene	ug/L	150	<0.050	<0.050	<0.050	0.050	0.050	A545443
Phenanthrene	ug/L	-	<0.050	<0.050	<0.050	0.050	0.050	A545443
Anthracene	ug/L	1000	<0.010	<0.010	<0.010	0.010	0.010	A545443
Acridine	ug/L	-	<0.050	<0.050	<0.050	0.050	0.050	A545443
Fluoranthene	ug/L	150	<0.020	<0.020	<0.020	0.020	0.020	A545443
Pyrene	ug/L	100	<0.020	<0.020	<0.020	0.020	0.020	A545443
Benzo(a)anthracene	ug/L	0.07	<0.010	<0.010	<0.010	0.010	0.010	A545443
Benzo(a)pyrene	ug/L	0.01	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A545443
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	-	95	96	96	N/A	N/A	A545443
D8-ACENAPHTHYLENE (sur.)	%	-	88	88	89	N/A	N/A	A545443
D8-NAPHTHALENE (sur.)	%	-	93	94	95	N/A	N/A	A545443
TERPHENYL-D14 (sur.)	%	-	96	95	96	N/A	N/A	A545443
No Fill	No Exceedance							
Grey	Exceeds 1 criteria policy/level							
Black	Exceeds both criteria/levels							
RDL = Reportable Detection Limit								
N/A = Not Applicable								



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID			AQZ069	AQZ070	AQZ071			
Sampling Date			2022/04/01 12:20	2022/04/01 12:30	2022/04/01 13:25			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-04	WG-11222680-010422 -MJ-05	WG-11222680-010422 -MJ-06	RDL	MDL	QC Batch
Polycyclic Aromatics								
Naphthalene	ug/L	80	<0.10	<0.10	<0.10	0.10	0.050	A545443
Acenaphthene	ug/L	250	<0.050	<0.050	<0.050	0.050	0.050	A545443
Fluorene	ug/L	150	<0.050	<0.050	<0.050	0.050	0.050	A545443
Phenanthrene	ug/L	-	<0.050	<0.050	<0.050	0.050	0.050	A545443
Anthracene	ug/L	1000	<0.010	<0.010	<0.010	0.010	0.010	A545443
Acridine	ug/L	-	<0.050	<0.050	<0.050	0.050	0.050	A545443
Fluoranthene	ug/L	150	<0.020	<0.020	<0.020	0.020	0.020	A545443
Pyrene	ug/L	100	<0.020	<0.020	<0.020	0.020	0.020	A545443
Benzo(a)anthracene	ug/L	0.07	<0.010	<0.010	<0.010	0.010	0.010	A545443
Benzo(a)pyrene	ug/L	0.01	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A545443
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	-	95	97	94	N/A	N/A	A545443
D8-ACENAPHTHYLENE (sur.)	%	-	89	90	88	N/A	N/A	A545443
D8-NAPHTHALENE (sur.)	%	-	92	94	94	N/A	N/A	A545443
TERPHENYL-D14 (sur.)	%	-	96	99	95	N/A	N/A	A545443
No Fill	No Exceedance							
Grey	Exceeds 1 criteria policy/level							
Black	Exceeds both criteria/levels							
RDL = Reportable Detection Limit								
N/A = Not Applicable								



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID			AQZ072	AQZ073	AQZ074			
Sampling Date			2022/04/01 14:20	2022/04/01 15:30	2022/04/01 17:20			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-07	WG-11222680-010422 -MJ-08	WG-11222680-010422 -MJ-09	RDL	MDL	QC Batch
Polycyclic Aromatics								
Naphthalene	ug/L	80	<0.10	<0.10	<0.10	0.10	0.050	A545443
Acenaphthene	ug/L	250	<0.050	<0.050	<0.050	0.050	0.050	A545443
Fluorene	ug/L	150	<0.050	<0.050	<0.050	0.050	0.050	A545443
Phenanthrene	ug/L	-	<0.050	<0.050	<0.050	0.050	0.050	A545443
Anthracene	ug/L	1000	<0.010	<0.010	<0.010	0.010	0.010	A545443
Acridine	ug/L	-	<0.050	<0.050	<0.050	0.050	0.050	A545443
Fluoranthene	ug/L	150	<0.020	<0.020	<0.020	0.020	0.020	A545443
Pyrene	ug/L	100	<0.020	<0.020	<0.020	0.020	0.020	A545443
Benzo(a)anthracene	ug/L	0.07	<0.010	<0.010	<0.010	0.010	0.010	A545443
Benzo(a)pyrene	ug/L	0.01	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A545443
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	-	96	98	94	N/A	N/A	A545443
D8-ACENAPHTHYLENE (sur.)	%	-	91	94	91	N/A	N/A	A545443
D8-NAPHTHALENE (sur.)	%	-	93	97	94	N/A	N/A	A545443
TERPHENYL-D14 (sur.)	%	-	93	98	93	N/A	N/A	A545443
No Fill	No Exceedance							
Grey	Exceeds 1 criteria policy/level							
Black	Exceeds both criteria/levels							
RDL = Reportable Detection Limit								
N/A = Not Applicable								



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID			AQZ075	AQZ080	AQZ081			
Sampling Date			2022/04/01 18:10	2022/04/01 16:10	2022/04/01 16:20			
COC Number			660946-01-01	660946-02-01	660946-02-01			
	UNITS	LOW	WG-11222680-010422 -MJ-10	WL-11222680-010422- MJ-01	WL-11222680-010422- MJ-02	RDL	MDL	QC Batch
Polycyclic Aromatics								
Naphthalene	ug/L	80	<0.10	1.1	1.1	0.10	0.050	A545443
Acenaphthene	ug/L	250	<0.050	0.39	0.38	0.050	0.050	A545443
Fluorene	ug/L	150	<0.050	0.15	0.15	0.050	0.050	A545443
Phenanthrene	ug/L	-	<0.050	0.14	0.13	0.050	0.050	A545443
Anthracene	ug/L	1000	<0.010	0.022 (1)	0.021 (1)	0.010	0.010	A545443
Acridine	ug/L	-	<0.050	0.21	0.21	0.050	0.050	A545443
Fluoranthene	ug/L	150	<0.020	0.23	0.22	0.020	0.020	A545443
Pyrene	ug/L	100	<0.020	0.15 (1)	0.15 (1)	0.020	0.020	A545443
Benzo(a)anthracene	ug/L	0.07	<0.010	0.046	0.041	0.010	0.010	A545443
Benzo(a)pyrene	ug/L	0.01	<0.0050	0.017	0.0089	0.0050	0.0050	A545443
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	-	95	84	77	N/A	N/A	A545443
D8-ACENAPHTHYLENE (sur.)	%	-	91	95	90	N/A	N/A	A545443
D8-NAPHTHALENE (sur.)	%	-	95	100	95	N/A	N/A	A545443
TERPHENYL-D14 (sur.)	%	-	95	62	43 (2)	N/A	N/A	A545443
No Fill	No Exceedance							
Grey	Exceeds 1 criteria policy/level							
Black	Exceeds both criteria/levels							
RDL = Reportable Detection Limit								
N/A = Not Applicable								
(1) Tentatively identified result and may be potentially biased high due to matrix interference.								
(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.								



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		AQZ078	AQZ078	AQZ079			
Sampling Date		2022/04/01 16:50	2022/04/01 16:50	2022/04/01 18:20			
COC Number		660946-02-01	660946-02-01	660946-02-01			
	UNITS	WS-11222680-010422-MJ-01	WS-11222680-010422-MJ-01 Lab-Dup	WS-11222680-010422-MJ-02	RDL	MDL	QC Batch

Dissolved Metals by ICP

Dissolved Calcium (Ca)	mg/L	4.29	4.35	7.17	0.050	0.050	A546357
Dissolved Magnesium (Mg)	mg/L	1.07	1.08	0.771	0.050	0.050	A546357

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		AQZ080	AQZ081			
Sampling Date		2022/04/01 16:10	2022/04/01 16:20			
COC Number		660946-02-01	660946-02-01			
	UNITS	WL-11222680-010422-MJ-01	WL-11222680-010422-MJ-02	RDL	MDL	QC Batch

Dissolved Metals by ICP

Dissolved Calcium (Ca)	mg/L	774	814	0.50	0.50	A546357
Dissolved Magnesium (Mg)	mg/L	47.0	46.5	0.50	0.50	A546357

RDL = Reportable Detection Limit



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

TOTAL PETROLEUM HYDROCARBONS (WATER)

Bureau Veritas ID			AQZ066	AQZ067	AQZ068			
Sampling Date			2022/04/01 11:10	2022/04/01 11:20	2022/04/01 12:40			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-01	WG-11222680-010422 -MJ-02	WG-11222680-010422 -MJ-03	RDL	MDL	QC Batch

Calculated Parameters								
LEPH (C10-C19 less PAH)	mg/L	-	<0.20	<0.20	<0.20	0.20	0.20	A542099
HEPH (C19-C32 less PAH)	mg/L	-	<0.20	<0.20	<0.20	0.20	0.20	A542099
Ext. Pet. Hydrocarbon								
EPH (C10-C19)	mg/L	5	<0.20	<0.20	<0.20	0.20	0.20	A545473
EPH (C19-C32)	mg/L	-	<0.20	<0.20	<0.20	0.20	0.20	A545473
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	-	110	109	110	N/A	N/A	A545473
No Fill	No Exceedance Exceeds 1 criteria policy/level Exceeds both criteria/levels							
Grey								
Black								
RDL = Reportable Detection Limit								
N/A = Not Applicable								

Bureau Veritas ID			AQZ069	AQZ070	AQZ071			
Sampling Date			2022/04/01 12:20	2022/04/01 12:30	2022/04/01 13:25			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-04	WG-11222680-010422 -MJ-05	WG-11222680-010422 -MJ-06	RDL	MDL	QC Batch

Calculated Parameters								
LEPH (C10-C19 less PAH)	mg/L	-	<0.20	<0.20	<0.20	0.20	0.20	A542099
HEPH (C19-C32 less PAH)	mg/L	-	<0.20	<0.20	<0.20	0.20	0.20	A542099
Ext. Pet. Hydrocarbon								
EPH (C10-C19)	mg/L	5	<0.20	<0.20	<0.20	0.20	0.20	A545473
EPH (C19-C32)	mg/L	-	<0.20	<0.20	<0.20	0.20	0.20	A545473
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	-	111	110	107	N/A	N/A	A545473
No Fill	No Exceedance Exceeds 1 criteria policy/level Exceeds both criteria/levels							
Grey								
Black								
RDL = Reportable Detection Limit								
N/A = Not Applicable								



BUREAU
VERITAS

Bureau Veritas Job #: C221453
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CW

TOTAL PETROLEUM HYDROCARBONS (WATER)

Bureau Veritas ID			AQZ072	AQZ073	AQZ074			
Sampling Date			2022/04/01 14:20	2022/04/01 15:30	2022/04/01 17:20			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-07	WG-11222680-010422 -MJ-08	WG-11222680-010422 -MJ-09	RDL	MDL	QC Batch

Calculated Parameters								
LEPH (C10-C19 less PAH)	mg/L	-	<0.20	<0.20	<0.20	0.20	0.20	A542099
HEPH (C19-C32 less PAH)	mg/L	-	0.22	<0.20	<0.20	0.20	0.20	A542099
Ext. Pet. Hydrocarbon								
EPH (C10-C19)	mg/L	5	<0.20	<0.20	<0.20	0.20	0.20	A545473
EPH (C19-C32)	mg/L	-	0.22	<0.20	<0.20	0.20	0.20	A545473
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	-	100	109	106	N/A	N/A	A545473
No Fill	No Exceedance Exceeds 1 criteria policy/level Exceeds both criteria/levels							
Grey								
Black								
RDL = Reportable Detection Limit								
N/A = Not Applicable								

Bureau Veritas ID			AQZ075	AQZ080	AQZ081			
Sampling Date			2022/04/01 18:10	2022/04/01 16:10	2022/04/01 16:20			
COC Number			660946-01-01	660946-02-01	660946-02-01			
	UNITS	LOW	WG-11222680-010422 -MJ-10	WL-11222680-010422- MJ-01	WL-11222680-010422- MJ-02	RDL	MDL	QC Batch

Calculated Parameters								
LEPH (C10-C19 less PAH)	mg/L	-	<0.20	0.73	0.70	0.20	0.20	A542099
HEPH (C19-C32 less PAH)	mg/L	-	<0.20	<0.20	<0.20	0.20	0.20	A542099
Ext. Pet. Hydrocarbon								
EPH (C10-C19)	mg/L	5	<0.20	0.73	0.70	0.20	0.20	A545473
EPH (C19-C32)	mg/L	-	<0.20	<0.20	<0.20	0.20	0.20	A545473
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	-	110	75	52 (1)	N/A	N/A	A545473
No Fill	No Exceedance Exceeds 1 criteria policy/level Exceeds both criteria/levels							
Grey								
Black								
RDL = Reportable Detection Limit N/A = Not Applicable (1) Surrogate recovery below acceptance criteria due to matrix interference. Unable to reanalyze due to insufficient sample.								



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

MISCELLANEOUS (WATER)

Bureau Veritas ID		AQZ066	AQZ067	AQZ068			
Sampling Date		2022/04/01 11:10	2022/04/01 11:20	2022/04/01 12:40			
COC Number		660946-01-01	660946-01-01	660946-01-01			
	UNITS	WG-11222680-010422 -MJ-01	WG-11222680-010422 -MJ-02	WG-11222680-010422 -MJ-03	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A542250
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A542250
RDL = Reportable Detection Limit							

Bureau Veritas ID		AQZ069	AQZ070	AQZ071			
Sampling Date		2022/04/01 12:20	2022/04/01 12:30	2022/04/01 13:25			
COC Number		660946-01-01	660946-01-01	660946-01-01			
	UNITS	WG-11222680-010422 -MJ-04	WG-11222680-010422 -MJ-05	WG-11222680-010422 -MJ-06	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	0.0055	<0.0050	<0.0050	0.0050	0.0050	A542250
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	0.0058	<0.0050	<0.0050	0.0050	0.0050	A542250
RDL = Reportable Detection Limit							

Bureau Veritas ID		AQZ072	AQZ073	AQZ074			
Sampling Date		2022/04/01 14:20	2022/04/01 15:30	2022/04/01 17:20			
COC Number		660946-01-01	660946-01-01	660946-01-01			
	UNITS	WG-11222680-010422 -MJ-07	WG-11222680-010422 -MJ-08	WG-11222680-010422 -MJ-09	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	0.032	<0.0050	0.026	0.0050	0.0050	A542250
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	0.034	<0.0050	0.027	0.0050	0.0050	A542250
RDL = Reportable Detection Limit							

Bureau Veritas ID		AQZ075	AQZ078	AQZ079			
Sampling Date		2022/04/01 18:10	2022/04/01 16:50	2022/04/01 18:20			
COC Number		660946-01-01	660946-02-01	660946-02-01			
	UNITS	WG-11222680-010422 -MJ-10	WS-11222680-010422 -MJ-01	WS-11222680-010422 -MJ-02	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A542250
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A542250
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

MISCELLANEOUS (WATER)

Bureau Veritas ID		AQZ080	AQZ081			
Sampling Date		2022/04/01 16:10	2022/04/01 16:20			
COC Number		660946-02-01	660946-02-01			
	UNITS	WL-11222680-010422- MJ-01	WL-11222680-010422- MJ-02	RDL	MDL	QC Batch
Calculated Parameters						
Total Un-ionized Hydrogen Sulfide as S	mg/L	7.4	10	0.0050	0.0050	A542250
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	7.9	11	0.0050	0.0050	A542250
RDL = Reportable Detection Limit						



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ066	AQZ067	AQZ068			
Sampling Date			2022/04/01 11:10	2022/04/01 11:20	2022/04/01 12:40			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-01	WG-11222680-010422 -MJ-02	WG-11222680-010422 -MJ-03	RDL	MDL	QC Batch

Calculated Parameters								
Dissolved Hardness (CaCO ₃)	mg/L	-	33.7	30.8	32.3	0.50	0.50	A542251
Elements								
Dissolved Mercury (Hg)	ug/L	1	<0.0019	<0.0019	<0.0019	0.0019	0.0019	A543723
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	9500	<3.0	4.2	5.1	3.0	0.030	A542974
Dissolved Antimony (Sb)	ug/L	6	<0.50	<0.50	<0.50	0.50	0.0020	A542974
Dissolved Arsenic (As)	ug/L	10	<0.10	<0.10	1.00	0.10	0.010	A542974
Dissolved Barium (Ba)	ug/L	1000	4.0	1.5	2.1	1.0	0.0020	A542974
Dissolved Beryllium (Be)	ug/L	8	<0.10	<0.10	<0.10	0.10	0.0030	A542974
Dissolved Bismuth (Bi)	ug/L	-	<1.0	<1.0	<1.0	1.0	0.0010	A542974
Dissolved Boron (B)	ug/L	5000	<50	<50	<50	50	50	A542974
Dissolved Cadmium (Cd)	ug/L	5	<0.010	<0.010	<0.010	0.010	0.0020	A542974
Dissolved Chromium (Cr)	ug/L	-	<1.0	<1.0	<1.0	1.0	0.020	A542974
Dissolved Cobalt (Co)	ug/L	1	<0.20	<0.20	<0.20	0.20	0.20	A542974
Dissolved Copper (Cu)	ug/L	1500	0.20	0.31	<0.20	0.20	0.010	A542974
Dissolved Iron (Fe)	ug/L	6500	<5.0	<5.0	<5.0	5.0	0.040	A542974
Dissolved Lead (Pb)	ug/L	10	<0.20	<0.20	<0.20	0.20	0.0010	A542974
Dissolved Lithium (Li)	ug/L	8	<2.0	<2.0	<2.0	2.0	2.0	A542974
Dissolved Manganese (Mn)	ug/L	1500	<1.0	<1.0	<1.0	1.0	0.030	A542974
Dissolved Molybdenum (Mo)	ug/L	250	<1.0	<1.0	<1.0	1.0	0.0020	A542974
Dissolved Nickel (Ni)	ug/L	80	<1.0	<1.0	<1.0	1.0	0.010	A542974
Dissolved Phosphorus (P)	ug/L	-	<10	<10	28	10	1.0	A542974
Dissolved Selenium (Se)	ug/L	10	0.71	0.66	<0.10	0.10	0.0060	A542974
Dissolved Silicon (Si)	ug/L	-	7230	7560	4130	100	0.30	A542974
Dissolved Silver (Ag)	ug/L	20	<0.020	<0.020	<0.020	0.020	0.0020	A542974
Dissolved Strontium (Sr)	ug/L	2500	54.5	55.5	13.2	1.0	0.0020	A542974
Dissolved Thallium (Tl)	ug/L	-	<0.010	<0.010	<0.010	0.010	0.010	A542974
Dissolved Tin (Sn)	ug/L	-	<5.0	<5.0	<5.0	5.0	0.0050	A542974
Dissolved Titanium (Ti)	ug/L	-	<5.0	<5.0	<5.0	5.0	0.30	A542974
Dissolved Uranium (U)	ug/L	20	<0.10	<0.10	<0.10	0.10	0.0010	A542974
Dissolved Vanadium (V)	ug/L	20	<5.0	<5.0	7.7	5.0	0.020	A542974

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels
RDL = Reportable Detection Limit	



**BUREAU
VERITAS**

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ066	AQZ067	AQZ068			
Sampling Date			2022/04/01 11:10	2022/04/01 11:20	2022/04/01 12:40			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-01	WG-11222680-010422 -MJ-02	WG-11222680-010422 -MJ-03	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	3000	<5.0	<5.0	<5.0	5.0	0.050	A542974
Dissolved Zirconium (Zr)	ug/L	-	<0.10	<0.10	<0.10	0.10	0.0080	A542974
Dissolved Calcium (Ca)	mg/L	-	9.80	8.93	10.5	0.050	0.0010	A542252
Dissolved Magnesium (Mg)	mg/L	-	2.23	2.06	1.49	0.050	0.00050	A542252
Dissolved Potassium (K)	mg/L	-	0.246	0.239	0.173	0.050	0.0020	A542252
Dissolved Sodium (Na)	mg/L	200	23.6	24.2	1.03	0.050	0.0010	A542252
Dissolved Sulphur (S)	mg/L	-	4.9	4.7	<3.0	3.0	1.0	A542252
No Fill	No Exceedance							
Grey	Exceeds 1 criteria policy/level							
Black	Exceeds both criteria/levels							
RDL = Reportable Detection Limit								



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ069	AQZ070	AQZ071			
Sampling Date			2022/04/01 12:20	2022/04/01 12:30	2022/04/01 13:25			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-04	WG-11222680-010422 -MJ-05	WG-11222680-010422 -MJ-06	RDL	MDL	QC Batch

Calculated Parameters								
Dissolved Hardness (CaCO ₃)	mg/L	-	52.2	<0.50	50.7	0.50	0.50	A542251
Elements								
Dissolved Mercury (Hg)	ug/L	1	<0.0019	<0.0019	<0.0019	0.0019	0.0019	A543723
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	9500	<3.0	<3.0	3.4	3.0	0.030	A542974
Dissolved Antimony (Sb)	ug/L	6	<0.50	<0.50	<0.50	0.50	0.0020	A542974
Dissolved Arsenic (As)	ug/L	10	<0.10	<0.10	0.12	0.10	0.010	A542974
Dissolved Barium (Ba)	ug/L	1000	1.4	<1.0	<1.0	1.0	0.0020	A542974
Dissolved Beryllium (Be)	ug/L	8	<0.10	<0.10	<0.10	0.10	0.0030	A542974
Dissolved Bismuth (Bi)	ug/L	-	<1.0	<1.0	<1.0	1.0	0.0010	A542974
Dissolved Boron (B)	ug/L	5000	<50	<50	<50	50	50	A542974
Dissolved Cadmium (Cd)	ug/L	5	<0.010	<0.010	<0.010	0.010	0.0020	A542974
Dissolved Chromium (Cr)	ug/L	-	<1.0	<1.0	<1.0	1.0	0.020	A542974
Dissolved Cobalt (Co)	ug/L	1	<0.20	<0.20	<0.20	0.20	0.20	A542974
Dissolved Copper (Cu)	ug/L	1500	<0.20	<0.20	<0.20	0.20	0.010	A542974
Dissolved Iron (Fe)	ug/L	6500	<5.0	<5.0	<5.0	5.0	0.040	A542974
Dissolved Lead (Pb)	ug/L	10	<0.20	<0.20	<0.20	0.20	0.0010	A542974
Dissolved Lithium (Li)	ug/L	8	<2.0	<2.0	<2.0	2.0	2.0	A542974
Dissolved Manganese (Mn)	ug/L	1500	<1.0	<1.0	<1.0	1.0	0.030	A542974
Dissolved Molybdenum (Mo)	ug/L	250	<1.0	<1.0	<1.0	1.0	0.0020	A542974
Dissolved Nickel (Ni)	ug/L	80	<1.0	<1.0	<1.0	1.0	0.010	A542974
Dissolved Phosphorus (P)	ug/L	-	<10	<10	<10	10	1.0	A542974
Dissolved Selenium (Se)	ug/L	10	0.11	<0.10	<0.10	0.10	0.0060	A542974
Dissolved Silicon (Si)	ug/L	-	6520	<100	5240	100	0.30	A542974
Dissolved Silver (Ag)	ug/L	20	<0.020	<0.020	<0.020	0.020	0.0020	A542974
Dissolved Strontium (Sr)	ug/L	2500	25.6	<1.0	23.8	1.0	0.0020	A542974
Dissolved Thallium (Tl)	ug/L	-	<0.010	<0.010	<0.010	0.010	0.010	A542974
Dissolved Tin (Sn)	ug/L	-	<5.0	<5.0	<5.0	5.0	0.0050	A542974
Dissolved Titanium (Ti)	ug/L	-	<5.0	<5.0	<5.0	5.0	0.30	A542974
Dissolved Uranium (U)	ug/L	20	<0.10	<0.10	<0.10	0.10	0.0010	A542974
Dissolved Vanadium (V)	ug/L	20	<5.0	<5.0	<5.0	5.0	0.020	A542974

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels
RDL = Reportable Detection Limit	



**BUREAU
VERITAS**

Bureau Veritas Job #: C221453
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ069	AQZ070	AQZ071			
Sampling Date			2022/04/01 12:20	2022/04/01 12:30	2022/04/01 13:25			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-04	WG-11222680-010422 -MJ-05	WG-11222680-010422 -MJ-06	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	3000	<5.0	<5.0	<5.0	5.0	0.050	A542974
Dissolved Zirconium (Zr)	ug/L	-	<0.10	<0.10	<0.10	0.10	0.0080	A542974
Dissolved Calcium (Ca)	mg/L	-	16.4	<0.050	16.9	0.050	0.0010	A542252
Dissolved Magnesium (Mg)	mg/L	-	2.72	<0.050	2.09	0.050	0.00050	A542252
Dissolved Potassium (K)	mg/L	-	0.209	<0.050	0.186	0.050	0.0020	A542252
Dissolved Sodium (Na)	mg/L	200	3.41	<0.050	1.73	0.050	0.0010	A542252
Dissolved Sulphur (S)	mg/L	-	<3.0	<3.0	<3.0	3.0	1.0	A542252
No Fill	No Exceedance Exceeds 1 criteria policy/level Exceeds both criteria/levels							
Grey								
Black								
RDL = Reportable Detection Limit								



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ072	AQZ073	AQZ074			
Sampling Date			2022/04/01 14:20	2022/04/01 15:30	2022/04/01 17:20			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-07	WG-11222680-010422 -MJ-08	WG-11222680-010422 -MJ-09	RDL	MDL	QC Batch

Calculated Parameters								
Dissolved Hardness (CaCO ₃)	mg/L	-	66.8	57.0	175	0.50	0.50	A542251
Elements								
Dissolved Mercury (Hg)	ug/L	1	<0.0019	<0.0019	<0.0019	0.0019	0.0019	A543723
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	9500	5.4	3.6	35.2	3.0	0.030	A542974
Dissolved Antimony (Sb)	ug/L	6	<0.50	<0.50	<0.50	0.50	0.0020	A542974
Dissolved Arsenic (As)	ug/L	10	0.20	0.44	0.20	0.10	0.010	A542974
Dissolved Barium (Ba)	ug/L	1000	4.4	2.8	28.1	1.0	0.0020	A542974
Dissolved Beryllium (Be)	ug/L	8	<0.10	<0.10	<0.10	0.10	0.0030	A542974
Dissolved Bismuth (Bi)	ug/L	-	<1.0	<1.0	<1.0	1.0	0.0010	A542974
Dissolved Boron (B)	ug/L	5000	<50	<50	<50	50	50	A542974
Dissolved Cadmium (Cd)	ug/L	5	<0.010	<0.010	0.013	0.010	0.0020	A542974
Dissolved Chromium (Cr)	ug/L	-	<1.0	<1.0	<1.0	1.0	0.020	A542974
Dissolved Cobalt (Co)	ug/L	1	<0.20	<0.20	0.49	0.20	0.20	A542974
Dissolved Copper (Cu)	ug/L	1500	0.28	0.31	0.64	0.20	0.010	A542974
Dissolved Iron (Fe)	ug/L	6500	6.4	<5.0	43.5	5.0	0.040	A542974
Dissolved Lead (Pb)	ug/L	10	<0.20	<0.20	<0.20	0.20	0.0010	A542974
Dissolved Lithium (Li)	ug/L	8	<2.0	<2.0	<2.0	2.0	2.0	A542974
Dissolved Manganese (Mn)	ug/L	1500	<1.0	<1.0	202	1.0	0.030	A542974
Dissolved Molybdenum (Mo)	ug/L	250	<1.0	<1.0	<1.0	1.0	0.0020	A542974
Dissolved Nickel (Ni)	ug/L	80	<1.0	<1.0	<1.0	1.0	0.010	A542974
Dissolved Phosphorus (P)	ug/L	-	10	13	<10	10	1.0	A542974
Dissolved Selenium (Se)	ug/L	10	0.22	0.12	<0.10	0.10	0.0060	A542974
Dissolved Silicon (Si)	ug/L	-	9510	6700	13300	100	0.30	A542974
Dissolved Silver (Ag)	ug/L	20	<0.020	<0.020	<0.020	0.020	0.0020	A542974
Dissolved Strontium (Sr)	ug/L	2500	32.8	25.2	104	1.0	0.0020	A542974
Dissolved Thallium (Tl)	ug/L	-	<0.010	<0.010	<0.010	0.010	0.010	A542974
Dissolved Tin (Sn)	ug/L	-	<5.0	<5.0	<5.0	5.0	0.0050	A542974
Dissolved Titanium (Ti)	ug/L	-	<5.0	<5.0	<5.0	5.0	0.30	A542974
Dissolved Uranium (U)	ug/L	20	<0.10	<0.10	<0.10	0.10	0.0010	A542974
Dissolved Vanadium (V)	ug/L	20	<5.0	<5.0	<5.0	5.0	0.020	A542974

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels
RDL = Reportable Detection Limit	



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ072	AQZ073	AQZ074			
Sampling Date			2022/04/01 14:20	2022/04/01 15:30	2022/04/01 17:20			
COC Number			660946-01-01	660946-01-01	660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-07	WG-11222680-010422 -MJ-08	WG-11222680-010422 -MJ-09	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	3000	<5.0	<5.0	<5.0	5.0	0.050	A542974
Dissolved Zirconium (Zr)	ug/L	-	<0.10	<0.10	<0.10	0.10	0.0080	A542974
Dissolved Calcium (Ca)	mg/L	-	21.2	18.4	44.7	0.050	0.0010	A542252
Dissolved Magnesium (Mg)	mg/L	-	3.35	2.69	15.5	0.050	0.00050	A542252
Dissolved Potassium (K)	mg/L	-	0.353	0.313	1.10	0.050	0.0020	A542252
Dissolved Sodium (Na)	mg/L	200	5.55	4.85	23.1	0.050	0.0010	A542252
Dissolved Sulphur (S)	mg/L	-	<3.0	<3.0	<3.0	3.0	1.0	A542252
No Fill	No Exceedance							
Grey	Exceeds 1 criteria policy/level							
Black	Exceeds both criteria/levels							
RDL = Reportable Detection Limit								



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ075			
Sampling Date			2022/04/01 18:10			
COC Number			660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-10	RDL	MDL	QC Batch
Calculated Parameters						
Dissolved Hardness (CaCO3)	mg/L	-	27.6	0.50	0.50	A542251
Elements						
Dissolved Mercury (Hg)	ug/L	1	<0.0019	0.0019	0.0019	A543723
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	9500	5.0	3.0	0.030	A542974
Dissolved Antimony (Sb)	ug/L	6	<0.50	0.50	0.0020	A542974
Dissolved Arsenic (As)	ug/L	10	0.14	0.10	0.010	A542974
Dissolved Barium (Ba)	ug/L	1000	1.2	1.0	0.0020	A542974
Dissolved Beryllium (Be)	ug/L	8	<0.10	0.10	0.0030	A542974
Dissolved Bismuth (Bi)	ug/L	-	<1.0	1.0	0.0010	A542974
Dissolved Boron (B)	ug/L	5000	<50	50	50	A542974
Dissolved Cadmium (Cd)	ug/L	5	<0.010	0.010	0.0020	A542974
Dissolved Chromium (Cr)	ug/L	-	<1.0	1.0	0.020	A542974
Dissolved Cobalt (Co)	ug/L	1	<0.20	0.20	0.20	A542974
Dissolved Copper (Cu)	ug/L	1500	<0.20	0.20	0.010	A542974
Dissolved Iron (Fe)	ug/L	6500	8.1	5.0	0.040	A542974
Dissolved Lead (Pb)	ug/L	10	<0.20	0.20	0.0010	A542974
Dissolved Lithium (Li)	ug/L	8	<2.0	2.0	2.0	A542974
Dissolved Manganese (Mn)	ug/L	1500	1.4	1.0	0.030	A542974
Dissolved Molybdenum (Mo)	ug/L	250	<1.0	1.0	0.0020	A542974
Dissolved Nickel (Ni)	ug/L	80	<1.0	1.0	0.010	A542974
Dissolved Phosphorus (P)	ug/L	-	<10	10	1.0	A542974
Dissolved Selenium (Se)	ug/L	10	<0.10	0.10	0.0060	A542974
Dissolved Silicon (Si)	ug/L	-	3220	100	0.30	A542974
Dissolved Silver (Ag)	ug/L	20	<0.020	0.020	0.0020	A542974
Dissolved Strontium (Sr)	ug/L	2500	11.9	1.0	0.0020	A542974
Dissolved Thallium (Tl)	ug/L	-	<0.010	0.010	0.010	A542974
Dissolved Tin (Sn)	ug/L	-	<5.0	5.0	0.0050	A542974
Dissolved Titanium (Ti)	ug/L	-	<5.0	5.0	0.30	A542974
Dissolved Uranium (U)	ug/L	20	<0.10	0.10	0.0010	A542974
Dissolved Vanadium (V)	ug/L	20	<5.0	5.0	0.020	A542974
No Fill	No Exceedance					
Grey	Exceeds 1 criteria policy/level					
Black	Exceeds both criteria/levels					
RDL = Reportable Detection Limit						



**BUREAU
VERITAS**

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ075			
Sampling Date			2022/04/01 18:10			
COC Number			660946-01-01			
	UNITS	LOW	WG-11222680-010422 -MJ-10	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	3000	<5.0	5.0	0.050	A542974
Dissolved Zirconium (Zr)	ug/L	-	<0.10	0.10	0.0080	A542974
Dissolved Calcium (Ca)	mg/L	-	9.13	0.050	0.0010	A542252
Dissolved Magnesium (Mg)	mg/L	-	1.18	0.050	0.00050	A542252
Dissolved Potassium (K)	mg/L	-	0.125	0.050	0.0020	A542252
Dissolved Sodium (Na)	mg/L	200	0.775	0.050	0.0010	A542252
Dissolved Sulphur (S)	mg/L	-	<3.0	3.0	1.0	A542252
No Fill	No Exceedance					
Grey	Exceeds 1 criteria policy/level					
Black	Exceeds both criteria/levels					
RDL = Reportable Detection Limit						



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ078	AQZ079			
Sampling Date			2022/04/01 16:50	2022/04/01 18:20			
COC Number			660946-02-01	660946-02-01			
	UNITS	LOW	WS-11222680-010422-MJ-01	WS-11222680-010422-MJ-02	RDL	MDL	QC Batch
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	-	15.1	21.3	0.50	0.50	A542079
Elements							
Total Mercury (Hg)	ug/L	1	<0.0019	0.0032	0.0019	0.0019	A542868
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	9500	12.2	92.4	3.0	0.030	A542746
Total Antimony (Sb)	ug/L	6	<0.50	<0.50	0.50	0.0020	A542746
Total Arsenic (As)	ug/L	10	<0.10	0.10	0.10	0.010	A542746
Total Barium (Ba)	ug/L	1000	2.3	2.8	1.0	0.0020	A542746
Total Beryllium (Be)	ug/L	8	<0.10	<0.10	0.10	0.0030	A542746
Total Bismuth (Bi)	ug/L	-	<1.0	<1.0	1.0	0.0010	A542746
Total Boron (B)	ug/L	5000	<50	<50	50	50	A542746
Total Cadmium (Cd)	ug/L	5	<0.010	<0.010	0.010	0.0020	A542746
Total Chromium (Cr)	ug/L	-	<1.0	<1.0	1.0	0.020	A542746
Total Cobalt (Co)	ug/L	1	<0.20	<0.20	0.20	0.20	A542746
Total Copper (Cu)	ug/L	1500	0.53	0.71	0.50	0.030	A542746
Total Iron (Fe)	ug/L	6500	152	88	10	0.70	A542746
Total Lead (Pb)	ug/L	10	<0.20	<0.20	0.20	0.0010	A542746
Total Lithium (Li)	ug/L	8	<2.0	<2.0	2.0	2.0	A542746
Total Manganese (Mn)	ug/L	1500	17.4	5.3	1.0	0.030	A542746
Total Molybdenum (Mo)	ug/L	250	<1.0	<1.0	1.0	0.0020	A542746
Total Nickel (Ni)	ug/L	80	<1.0	<1.0	1.0	0.010	A542746
Total Phosphorus (P)	ug/L	-	<10	<10	10	1.0	A542746
Total Selenium (Se)	ug/L	10	<0.10	<0.10	0.10	0.0060	A542746
Total Silicon (Si)	ug/L	-	1570	1700	100	0.30	A542746
Total Silver (Ag)	ug/L	20	<0.020	<0.020	0.020	0.0020	A542746
Total Strontium (Sr)	ug/L	2500	13.9	10.9	1.0	0.0020	A542746
Total Thallium (Tl)	ug/L	-	<0.010	<0.010	0.010	0.010	A542746
Total Tin (Sn)	ug/L	-	<5.0	<5.0	5.0	0.0050	A542746
Total Titanium (Ti)	ug/L	-	<5.0	<5.0	5.0	0.30	A542746
Total Uranium (U)	ug/L	20	<0.10	<0.10	0.10	0.0010	A542746
Total Vanadium (V)	ug/L	20	<5.0	<5.0	5.0	0.020	A542746
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ078	AQZ079			
Sampling Date			2022/04/01 16:50	2022/04/01 18:20			
COC Number			660946-02-01	660946-02-01			
	UNITS	LOW	WS-11222680-010422-MJ-01	WS-11222680-010422-MJ-02	RDL	MDL	QC Batch
Total Zinc (Zn)	ug/L	3000	<5.0	<5.0	5.0	0.050	A542746
Total Zirconium (Zr)	ug/L	-	<0.10	<0.10	0.10	0.0080	A542746
Total Calcium (Ca)	mg/L	-	4.27	7.21	0.050	0.0010	A542253
Total Magnesium (Mg)	mg/L	-	1.06	0.812	0.050	0.00050	A542253
Total Potassium (K)	mg/L	-	0.131	0.078	0.050	0.0020	A542253
Total Sodium (Na)	mg/L	200	3.88	0.905	0.050	0.0010	A542253
Total Sulphur (S)	mg/L	-	<3.0	<3.0	3.0	1.0	A542253
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ080	AQZ081			
Sampling Date			2022/04/01 16:10	2022/04/01 16:20			
COC Number			660946-02-01	660946-02-01			
	UNITS	LOW	WL-11222680-010422-MJ-01	WL-11222680-010422-MJ-02	RDL	MDL	QC Batch
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	-	2370	2310	0.50	0.50	A542079
Elements							
Total Mercury (Hg)	ug/L	1	0.230	0.221	0.0019	0.0019	A542868
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	9500	1050	882	30	0.30	A542746
Total Antimony (Sb)	ug/L	6	<5.0	5.8	5.0	0.020	A542746
Total Arsenic (As)	ug/L	10	31.9	33.4	1.0	0.10	A542746
Total Barium (Ba)	ug/L	1000	253	250	10	0.020	A542746
Total Beryllium (Be)	ug/L	8	<1.0	<1.0	1.0	0.030	A542746
Total Bismuth (Bi)	ug/L	-	<10	<10	10	0.010	A542746
Total Boron (B)	ug/L	5000	13800	13800	500	500	A542746
Total Cadmium (Cd)	ug/L	5	0.99	1.02	0.10	0.020	A542746
Total Chromium (Cr)	ug/L	-	19	18	10	0.20	A542746
Total Cobalt (Co)	ug/L	1	15.0	14.7	2.0	2.0	A542746
Total Copper (Cu)	ug/L	1500	33.7	35.3	5.0	0.30	A542746
Total Iron (Fe)	ug/L	6500	22600	22100	100	7.0	A542746
Total Lead (Pb)	ug/L	10	8.6	8.4	2.0	0.010	A542746
Total Lithium (Li)	ug/L	8	<20 (1)	<20 (1)	20	20	A542746
Total Manganese (Mn)	ug/L	1500	7570	7340	10	0.30	A542746
Total Molybdenum (Mo)	ug/L	250	<10	<10	10	0.020	A542746
Total Nickel (Ni)	ug/L	80	22	21	10	0.10	A542746
Total Phosphorus (P)	ug/L	-	1290	1250	100	10	A542746
Total Selenium (Se)	ug/L	10	<1.0	<1.0	1.0	0.060	A542746
Total Silicon (Si)	ug/L	-	21800	21100	1000	3.0	A542746
Total Silver (Ag)	ug/L	20	<0.20	<0.20	0.20	0.020	A542746
Total Strontium (Sr)	ug/L	2500	3370	3240	10	0.020	A542746
Total Thallium (Tl)	ug/L	-	<0.10	<0.10	0.10	0.10	A542746
Total Tin (Sn)	ug/L	-	<50	<50	50	0.050	A542746
Total Titanium (Ti)	ug/L	-	143	147	50	3.0	A542746
Total Uranium (U)	ug/L	20	<1.0	<1.0	1.0	0.010	A542746
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							
(1) RDL exceeds criteria							



CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID			AQZ080	AQZ081			
Sampling Date			2022/04/01 16:10	2022/04/01 16:20			
COC Number			660946-02-01	660946-02-01			
	UNITS	LOW	WL-11222680-010422- MJ-01	WL-11222680-010422- MJ-02	RDL	MDL	QC Batch
Total Vanadium (V)	ug/L	20	161	154	50	0.20	A542746
Total Zinc (Zn)	ug/L	3000	2030	1990	50	0.50	A542746
Total Zirconium (Zr)	ug/L	-	5.0	5.1	1.0	0.080	A542746
Total Calcium (Ca)	mg/L	-	866	844	0.50	0.010	A542253
Total Magnesium (Mg)	mg/L	-	51.0	48.9	0.50	0.0050	A542253
Total Potassium (K)	mg/L	-	58.9	57.9	0.50	0.020	A542253
Total Sodium (Na)	mg/L	200	246	239	0.50	0.010	A542253
Total Sulphur (S)	mg/L	-	380	378	30	10	A542253
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							



GENERAL COMMENTS

Version 2: Report reissued to include BC CSR Drinking Water criteria - 2022/04/19

Version 3: Report reissued to include results for dissolved phosphorus on samples requesting dissolved metals on 2022/07/06

Sample AQZ078 [WS-11222680-010422-MJ-01] : The sample for dissolved metals was filtered and preserved at the lab. Values may not reflect concentrations at the time of sampling.

Sample AQZ079 [WS-11222680-010422-MJ-02] : The sample for dissolved metals was filtered and preserved at the lab. Values may not reflect concentrations at the time of sampling.

Sample AQZ080 [WL-11222680-010422-MJ-01] : The sample for dissolved metals was filtered and preserved at the lab. Values may not reflect concentrations at the time of sampling.

Sample AQZ081 [WL-11222680-010422-MJ-02] : The sample for dissolved metals was filtered and preserved at the lab. Values may not reflect concentrations at the time of sampling.

LOW: B.C. Contaminated Sites Regulation (375/96) - Schedule 3.2, Generic Numerical Water Standards for Drinking Water.

- LOW = Lowest Standard for Drinking Water;

- Note 1: Ammonia standards vary with pH and temperature.

- Note 2: Cadmium, Copper, Fluoride, Lead, Nickel, Silver, and Zinc standards vary with water hardness.

- Note 3: Nitrite standards vary with Chloride concentration.

- Note 4: Salinity standards vary with natural salinity of receiving water body.

- Note 5: Chlorinated Phenols standards vary with pH, temperature and substance isomer.

Measurement of Uncertainty has not been accounted for when stating conformity to the selected criteria, where applicable.

Results relate only to the items tested.

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Bureau Veritas Job #: C221453

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A545443	D10-ANTHRACENE (sur.)	2022/04/06	91	50 - 140	97	50 - 140	90	%		
A545443	D8-ACENAPHTHYLENE (sur.)	2022/04/06	95	50 - 140	90	50 - 140	82	%		
A545443	D8-NAPHTHALENE (sur.)	2022/04/06	93	50 - 140	89	50 - 140	73	%		
A545443	TERPHENYL-D14 (sur.)	2022/04/06	76	50 - 140	102	50 - 140	93	%		
A545473	O-TERPHENYL (sur.)	2022/04/07	109	60 - 140	107	60 - 140	104	%		
A542260	Orthophosphate (P)	2022/04/02	103 (1)	80 - 120	101	80 - 120	<0.0030	mg/L	11 (2)	20
A542261	Nitrate plus Nitrite (N)	2022/04/02	87 (1)	80 - 120	105	80 - 120	<0.020	mg/L	0.20 (2)	25
A542262	Nitrite (N)	2022/04/02	101 (1)	80 - 120	107	80 - 120	<0.0050	mg/L	NC (2)	20
A542746	Total Aluminum (Al)	2022/04/06	NC	80 - 120	105	80 - 120	<3.0	ug/L	4.6 (4)	20
A542746	Total Antimony (Sb)	2022/04/06	103	80 - 120	106	80 - 120	<0.50	ug/L	NC (4)	20
A542746	Total Arsenic (As)	2022/04/06	108	80 - 120	108	80 - 120	<0.10	ug/L	2.8 (4)	20
A542746	Total Barium (Ba)	2022/04/06	102	80 - 120	103	80 - 120	<1.0	ug/L	1.4 (4)	20
A542746	Total Beryllium (Be)	2022/04/06	103	80 - 120	106	80 - 120	<0.10	ug/L	NC (4)	20
A542746	Total Bismuth (Bi)	2022/04/06	101	80 - 120	106	80 - 120	<1.0	ug/L	NC (4)	20
A542746	Total Boron (B)	2022/04/06	186 (3)	80 - 120	109	80 - 120	<50	ug/L	NC (4)	20
A542746	Total Cadmium (Cd)	2022/04/06	102	80 - 120	104	80 - 120	<0.010	ug/L	NC (4)	20
A542746	Total Chromium (Cr)	2022/04/06	104	80 - 120	106	80 - 120	<1.0	ug/L	NC (4)	20
A542746	Total Cobalt (Co)	2022/04/06	102	80 - 120	104	80 - 120	<0.20	ug/L	NC (4)	20
A542746	Total Copper (Cu)	2022/04/06	NC	80 - 120	102	80 - 120	<0.50	ug/L	0.0085 (4)	20
A542746	Total Iron (Fe)	2022/04/06	101	80 - 120	109	80 - 120	<10	ug/L	NC (4)	20
A542746	Total Lead (Pb)	2022/04/06	NC	80 - 120	109	80 - 120	<0.20	ug/L	0.35 (4)	20
A542746	Total Lithium (Li)	2022/04/06	97	80 - 120	103	80 - 120	<2.0	ug/L		
A542746	Total Manganese (Mn)	2022/04/06	102	80 - 120	105	80 - 120	<1.0	ug/L	NC (4)	20
A542746	Total Molybdenum (Mo)	2022/04/06	109	80 - 120	106	80 - 120	<1.0	ug/L	NC (4)	20
A542746	Total Nickel (Ni)	2022/04/06	101	80 - 120	105	80 - 120	<1.0	ug/L	NC (4)	20
A542746	Total Phosphorus (P)	2022/04/06	NC	80 - 120	103	80 - 120	<10	ug/L		
A542746	Total Selenium (Se)	2022/04/06	106	80 - 120	106	80 - 120	<0.10	ug/L	NC (4)	20
A542746	Total Silicon (Si)	2022/04/06	98	80 - 120	108	80 - 120	<100	ug/L	2.2 (4)	20
A542746	Total Silver (Ag)	2022/04/06	105	80 - 120	103	80 - 120	<0.020	ug/L	NC (4)	20
A542746	Total Strontium (Sr)	2022/04/06	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.10 (4)	20
A542746	Total Thallium (Tl)	2022/04/06	100	80 - 120	105	80 - 120	<0.010	ug/L	NC (4)	20



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Bureau Veritas Job #: C221453

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A542746	Total Tin (Sn)	2022/04/06	NC	80 - 120	104	80 - 120	<5.0	ug/L	NC (4)	20
A542746	Total Titanium (Ti)	2022/04/06	91	80 - 120	103	80 - 120	<5.0	ug/L	NC (4)	20
A542746	Total Uranium (U)	2022/04/06	101	80 - 120	108	80 - 120	<0.10	ug/L	NC (4)	20
A542746	Total Vanadium (V)	2022/04/06	102	80 - 120	105	80 - 120	<5.0	ug/L	NC (4)	20
A542746	Total Zinc (Zn)	2022/04/06	NC	80 - 120	106	80 - 120	<5.0	ug/L	1.6 (4)	20
A542746	Total Zirconium (Zr)	2022/04/06	67 (3)	80 - 120	103	80 - 120	<0.10	ug/L	NC (4)	20
A542868	Total Mercury (Hg)	2022/04/04	89	80 - 120	97	80 - 120	<0.0019	ug/L	NC (4)	20
A542974	Dissolved Aluminum (Al)	2022/04/04	101	80 - 120	99	80 - 120	<3.0	ug/L		
A542974	Dissolved Antimony (Sb)	2022/04/04	100	80 - 120	103	80 - 120	<0.50	ug/L		
A542974	Dissolved Arsenic (As)	2022/04/04	103	80 - 120	102	80 - 120	<0.10	ug/L	1.3 (4)	20
A542974	Dissolved Barium (Ba)	2022/04/04	100	80 - 120	99	80 - 120	<1.0	ug/L		
A542974	Dissolved Beryllium (Be)	2022/04/04	98	80 - 120	108	80 - 120	<0.10	ug/L		
A542974	Dissolved Bismuth (Bi)	2022/04/04	99	80 - 120	97	80 - 120	<1.0	ug/L		
A542974	Dissolved Boron (B)	2022/04/04	99	80 - 120	111	80 - 120	<50	ug/L		
A542974	Dissolved Cadmium (Cd)	2022/04/04	101	80 - 120	101	80 - 120	<0.010	ug/L		
A542974	Dissolved Chromium (Cr)	2022/04/04	99	80 - 120	98	80 - 120	<1.0	ug/L		
A542974	Dissolved Cobalt (Co)	2022/04/04	97	80 - 120	100	80 - 120	<0.20	ug/L		
A542974	Dissolved Copper (Cu)	2022/04/04	95	80 - 120	97	80 - 120	<0.20	ug/L		
A542974	Dissolved Iron (Fe)	2022/04/04	NC	80 - 120	100	80 - 120	<5.0	ug/L		
A542974	Dissolved Lead (Pb)	2022/04/04	102	80 - 120	99	80 - 120	<0.20	ug/L		
A542974	Dissolved Lithium (Li)	2022/04/04	95	80 - 120	101	80 - 120	<2.0	ug/L		
A542974	Dissolved Manganese (Mn)	2022/04/04	NC	80 - 120	100	80 - 120	<1.0	ug/L		
A542974	Dissolved Molybdenum (Mo)	2022/04/04	105	80 - 120	104	80 - 120	<1.0	ug/L		
A542974	Dissolved Nickel (Ni)	2022/04/04	98	80 - 120	101	80 - 120	<1.0	ug/L		
A542974	Dissolved Phosphorus (P)	2022/04/04	101	80 - 120	97	80 - 120	<10	ug/L		
A542974	Dissolved Selenium (Se)	2022/04/04	104	80 - 120	100	80 - 120	<0.10	ug/L		
A542974	Dissolved Silicon (Si)	2022/04/04	NC	80 - 120	102	80 - 120	<100	ug/L		
A542974	Dissolved Silver (Ag)	2022/04/04	98	80 - 120	99	80 - 120	<0.020	ug/L		
A542974	Dissolved Strontium (Sr)	2022/04/04	NC	80 - 120	100	80 - 120	<1.0	ug/L		
A542974	Dissolved Thallium (Tl)	2022/04/04	101	80 - 120	97	80 - 120	<0.010	ug/L		
A542974	Dissolved Tin (Sn)	2022/04/04	101	80 - 120	102	80 - 120	<5.0	ug/L		



**BUREAU
VERITAS**

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A542974	Dissolved Titanium (Ti)	2022/04/04	103	80 - 120	102	80 - 120	<5.0	ug/L		
A542974	Dissolved Uranium (U)	2022/04/04	103	80 - 120	99	80 - 120	<0.10	ug/L		
A542974	Dissolved Vanadium (V)	2022/04/04	101	80 - 120	98	80 - 120	<5.0	ug/L		
A542974	Dissolved Zinc (Zn)	2022/04/04	100	80 - 120	103	80 - 120	<5.0	ug/L		
A542974	Dissolved Zirconium (Zr)	2022/04/04	104	80 - 120	101	80 - 120	<0.10	ug/L		
A543288	Biochemical Oxygen Demand	2022/04/09			91	85 - 115	<2.0	mg/L	4.4 (4)	20
A543723	Dissolved Mercury (Hg)	2022/04/05	110 (5)	80 - 120	100	80 - 120	<0.0019	ug/L	NC (4)	20
A543842	Chemical Oxygen Demand	2022/04/05	NC	80 - 120	102	80 - 120	<10	mg/L	9.7 (4)	20
A544362	Alkalinity (PP as CaCO3)	2022/04/04					<1.0	mg/L	NC (4)	20
A544362	Alkalinity (Total as CaCO3)	2022/04/04	NC	80 - 120	94	80 - 120	<1.0	mg/L	2.7 (4)	20
A544362	Bicarbonate (HCO3)	2022/04/04					<1.0	mg/L	2.7 (4)	20
A544362	Carbonate (CO3)	2022/04/04					<1.0	mg/L	NC (4)	20
A544362	Hydroxide (OH)	2022/04/04					<1.0	mg/L	NC (4)	20
A544363	Conductivity	2022/04/04			101	80 - 120	<2.0	uS/cm	1.6 (4)	10
A544369	Total Dissolved Solids	2022/04/06	102	80 - 120	100	80 - 120	<10	mg/L	2.8 (4)	20
A544371	Alkalinity (PP as CaCO3)	2022/04/04					<1.0	mg/L	NC (7)	20
A544371	Alkalinity (Total as CaCO3)	2022/04/04	107 (6)	80 - 120	94	80 - 120	<1.0	mg/L	8.8 (7)	20
A544371	Bicarbonate (HCO3)	2022/04/04					<1.0	mg/L	8.8 (7)	20
A544371	Carbonate (CO3)	2022/04/04					<1.0	mg/L	NC (7)	20
A544371	Hydroxide (OH)	2022/04/04					<1.0	mg/L	NC (7)	20
A544372	Conductivity	2022/04/04			101	80 - 120	<2.0	uS/cm	0.21 (7)	10
A544948	Total Sulphide	2022/04/06	114 (8)	80 - 120	105	80 - 120	<0.0018	mg/L	NC (4)	20
A545018	Total Suspended Solids	2022/04/07	104	80 - 120	100	80 - 120	<1.0	mg/L	NC (4)	20
A545041	Total Dissolved Solids	2022/04/07	101	80 - 120	92	80 - 120	<10	mg/L	9.5 (4)	20
A545443	Acenaphthene	2022/04/07	NC	50 - 140	93	50 - 140	<0.050	ug/L	NC (4)	40
A545443	Acridine	2022/04/07	103	50 - 140	102	50 - 140	<0.050	ug/L	NC (4)	40
A545443	Anthracene	2022/04/07	95	50 - 140	96	50 - 140	<0.010	ug/L	NC (4)	40
A545443	Benzo(a)anthracene	2022/04/07	67	50 - 140	97	50 - 140	<0.010	ug/L	NC (4)	40
A545443	Benzo(a)pyrene	2022/04/07	31 (3)	50 - 140	94	50 - 140	<0.0050	ug/L	NC (4)	40
A545443	Fluoranthene	2022/04/07	97	50 - 140	89	50 - 140	<0.020	ug/L	1.0 (4)	40
A545443	Fluorene	2022/04/07	97	50 - 140	91	50 - 140	<0.050	ug/L	7.4 (4)	40



**BUREAU
VERITAS**

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A545443	Naphthalene	2022/04/07	NC	50 - 140	88	50 - 140	<0.10	ug/L	4.9 (4)	40
A545443	Phenanthrene	2022/04/07	91	50 - 140	91	50 - 140	<0.050	ug/L	5.1 (4)	40
A545443	Pyrene	2022/04/07	94	50 - 140	95	50 - 140	<0.020	ug/L	6.8 (4)	40
A545473	EPH (C10-C19)	2022/04/07	107	60 - 140	113	70 - 130	<0.20	mg/L	NC (4)	30
A545473	EPH (C19-C32)	2022/04/07	100	60 - 140	114	70 - 130	<0.20	mg/L	NC (4)	30
A546357	Dissolved Calcium (Ca)	2022/04/07	89 (9)	80 - 120	95	80 - 120	<0.050	mg/L	1.3 (10)	20
A546357	Dissolved Magnesium (Mg)	2022/04/07	91 (9)	80 - 120	96	80 - 120	<0.050	mg/L	0.54 (10)	20
A546895	Chloride (Cl)	2022/04/07	NC	80 - 120	104	80 - 120	<1.0	mg/L	1.9 (4)	20
A546895	Sulphate (SO4)	2022/04/07	NC	80 - 120	101	80 - 120	<1.0	mg/L		
A546897	Chloride (Cl)	2022/04/07	97 (11)	80 - 120	106	80 - 120	<1.0	mg/L	2.2 (12)	20
A546897	Sulphate (SO4)	2022/04/07	116 (11)	80 - 120	108	80 - 120	<1.0	mg/L	16 (12)	20



BUREAU
VERITAS

Bureau Veritas Job #: C221453

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-3-2

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A548996	Total Ammonia (N)	2022/04/11	NC	80 - 120	102	80 - 120	<0.015	mg/L	0.33 (4)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Matrix Spike Parent ID [AQZ066-01]

(2) Duplicate Parent ID [AQZ066-01]

(3) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(4) Duplicate Parent ID

(5) Matrix Spike Parent ID [AQZ066-03]

(6) Matrix Spike Parent ID [AQZ079-01]

(7) Duplicate Parent ID [AQZ079-01]

(8) Matrix Spike Parent ID [AQZ066-04]

(9) Matrix Spike Parent ID [AQZ078-01]

(10) Duplicate Parent ID [AQZ078-01]

(11) Matrix Spike Parent ID [AQZ072-01]

(12) Duplicate Parent ID [AQZ072-01]



BUREAU
VERITAS

Bureau Veritas Job #: C221453
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680-3-2
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Sze Yeung Fock, B.Sc., Scientific Specialist

Thomas Pinchin, Project Solutions Representative



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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Bureau Veritas
4800 Canada Way, Burnaby, British Columbia Canada V5G 1K3 Tel: (804) 734 7276 Toll-free 800-563-6266 Fax: (804) 731 2586 www.bvna.com

Chain Of Custody Record

Page 1 of 2

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163: GHD Limited	Company Name	Airosse MacPhee	Quotation #	C10010	Bureau Veritas Job #	Bottle Order #:
Contact Name	AP Invoices - 735	Contact Name	Airosse MacPhee	P.O. #	735-002640		
Address	455 PHILLIP STREET WATERLOO ON N2L 3X2	Address		Project #	11222680		
Phone	(519) 884-0510	Phone		Project Name	Upland EMP	Chain Of Custody Record	Project Manager
Email	APInvoices-735@ghd.com	Email	airosse.macphee@ghd.com; NationalEDDSupport@ma	Site #	CW, M3		Thomas Pinchin

Regulatory Criteria: ☒ CSR (Drinking Water) ☐ CCME ☐ BC Water Quality ☐ Other	Special Instructions: All Samples were preserved and filtered as required. 2 coolers total.	ANALYSIS REQUESTED (PLEASE BE SPECIFIC) Metals Field Filtered? (Y/N) Conductivity, Cl, SO4, NO2, NO3, N+H, PO4, TDS, TSS, Sp. Alk. Total Sulphide, Total H2S, Un-ionized (as H2S) - based on total Ammonia-N (Total) LEPH/HEP/PAH Dissolved Metals with CV Hg Microchemical Oxygen Demand Orthophosphate Nitrate POC, PFA, PFA6 Dissolved Hardness	Turnaround Time (TAT) Required: Please provide advance notice for rush projects. Regular (Standard) TAT: (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dissolved Metals are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission): 1 Day ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐ Rush Confirmation Number: _____ (call lab for #)

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS													
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y/N)	Conductivity, Cl, SO4, NO2, NO3, N+H, PO4, TDS, TSS, Sp. Alk.	Total Sulphide, Total H2S, Un-ionized (as H2S) - based on total	Ammonia-N (Total)	LEPH/HEP/PAH	Dissolved Metals with CV Hg	Microchemical Oxygen Demand	Orthophosphate	Nitrate
WG-11222680-010422-M3-01		01-Apr-22	11:10	Ground Water	Y	X	X	X	X	X	X	X	X
WG-11222680-010422-M3-02			11:20			X	X	X	X	X	X	X	X
WG-11222680-010422-M3-03			12:40			X	X	X	X	X	X	X	X
WG-11222680-010422-M3-04			12:20			X	X	X	X	X	X	X	X
WG-11222680-010422-M3-05			12:30			X	X	X	X	X	X	X	X
WG-11222680-010422-M3-06			13:25			X	X	X	X	X	X	X	X
WG-11222680-010422-M3-07			14:20			X	X	X	X	X	X	X	X
WG-11222680-010422-M3-08			15:30			X	X	X	X	X	X	X	X
WG-11222680-010422-M3-09			17:20			X	X	X	X	X	X	X	X
WG-11222680-010422-M3-10			18:10			X	X	X	X	X	X	X	X

RELINQUISHED BY: (Signature/Print) Melissa Jenkins	Date: (YYMMDD) 22/04/01	Time: 2:00	RECEIVED BY: (Signature/Print) A. Fiora Lue	Date: (YYMMDD) 2023/04/01	Time: 13:45	# jars used and not submitted: 0	Lab Use Only Temperature (°C) on Receipt: 5/4/6, 2/3/3	Validity: See Print on Order? ☐ Yes ☒ No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.



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Chain Of Custody Record

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INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163 GHD Limited	Company Name	Airesse MacPhee	Quotation #	C10010	Bureau Veritas Job #	Bottle Order #:
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #	735-002640		
Address	455 PHILLIP STREET WATERLOO ON N2L 3X2	Address		Project #	11222680	Chain Of Custody Record	Project Manager
Phone	(519) 884-0510	Phone		Project Name	Upland EMP		
Fax	(519) 725-1394	Fax		Site #			
Email	APinvoices-735@ghd.com	Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Sampled By	CW, MJ		

Regulatory Criteria:	Special Instructions	ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required:	
☒ CSR (W) (Leachate)	All Samples were Field Filtered and preserved as required. 2 Coolers total.											Please provide advance notice for rush projects	
☐ CCME												Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests.	
☒ BC Water Quality (Surface water)												Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.	
☐ Other												Job Specific Rush TAT (if applies to entire submission) 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐	

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS															
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered?	Conductivity, Cl, SO4, NO2, NO3, N+N, PO4, TDS, TSS, Sp. Alk	Total Sulphide, Total H2S, Un-ionized (as H2S) - based on total	Ammonia-N (Total)	LEPH/HEPH	Total Metals with CV Hg	Bromine/Chlorine	Orthophosphate	Dissolved Hardness	# of Bottles	Comments
MS-11222680-010422-MS-01		01-Apr-22		Surface water										1	
WS-11222680-010422-WS-01			16:50			X	X	X		X		X	X	1	96
WS-11222680-010422-WS-02			18:20			X	X	X		X		X	X	1	96
WL-11222680-010422-WL-01			16:10	Leachate water		X	X	X	X	X		X	X	1	99
WL-11222680-010422-WL-02			16:20			X	X	X	X	X		X	X	1	99

* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only	
Melissa Jenkins		22/04/01	21:00	The PUMP Ltd		2022/04/02	13:48		Time Sensitive ☐	Temperature (°C) on Receipt 5/4/6, 2/3/3
								Custody Seal Intact on Cooler? ☐ Yes ☒ No		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS.

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100-YES



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Chain Of Custody Record

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INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163 GHQ Limited	Company Name	Alexia MacPhee	Quotation #	C10010	Bureau Veritas Job #	Sample Order #
Contact Name	AP Invoices - 735	Contact Name		P.O. #	735-007640		
Address	455 PHILIP STREET WATERLOO ON N6L 3K2	Address		Project #	11222080		
Phone	(519) 844-0510	Phone		Project Name	Upward Opkind EMP	Chain Of Custody Record	Project Manager
Fax	(519) 725-1264	Fax		Site #			
Email	APInvoices-735@ghq.com	Email	alexia.macphee@bvt.com; Nabona@BDSupport@bvt.com	Sampled By	CW.MJ		Thomas Proctor

Regulatory Criteria:		Special Instructions:		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required				
☒ CSE (Drinking Water) ☐ COME ☐ SC Water Quality ☐ Other _____		All Samples were preserved and filtered as required: 2 coolers total.		ANALYSIS REQUESTED (PLEASE BE SPECIFIC) Conductivity, Cl, SO ₄ , NO ₂ , NO ₃ , NH ₄ , H ₂ S, TDS, TSS, SS, Aik Total Sulphide, Total H ₂ S, CH ₃ -SH (as H ₂ S) - based on total Ammonia-N (Total) LEPTHEPHEM Dissolved Metals with CV-Hg Dissolved Organic Carbon orthophosphate nitrite nitrate POC-HIGH-TEMP Dissolved Hardness										Regular (Standard TAT) (will be applied if Rush TAT is not specified) Standard TAT = 5-7 working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dissolved Oxygen are > 5 days - contact your Project Manager for details. Rush Specific Rush TAT (if applies to entire submission) 1 DAY ☐ 2 DAY ☐ 3 DAY ☐ Other Required ☐ Rush Confirmation Number: _____ (used for R) Comments: _____				
SAMPLES MUST BE KEPT COOL (< 4°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS																		
Sample Barcode Label	Sample Location/Description	Date Sampled	Time Sampled	Matrix	Leptothorax (Y/N)	Conductivity, Cl, SO ₄ , NO ₂ , NO ₃ , NH ₄ , H ₂ S, TDS, TSS, SS, Aik	Total Sulphide, Total H ₂ S, CH ₃ -SH (as H ₂ S) - based on total	Ammonia-N (Total)	LEPTHEPHEM	Dissolved Metals with CV-Hg	Dissolved Organic Carbon	orthophosphate	nitrite	nitrate	POC-HIGH-TEMP	Dissolved Hardness	# of bottles	Comments
WG-11222680-010423-M0-01		01-Apr-23	11:10	Ground Water	Y	X	X	X	X	X	X	X	X	X	X	X	6	
WG-11222680-010423-M0-02			11:20			X	X	X	X	X	X	X	X	X	X	X	6	
WG-11222680-010423-M0-03			12:40			X	X	X	X	X	X	X	X	X	X	X	6	
WG-11222680-010423-M0-04			12:20			X	X	X	X	X	X	X	X	X	X	X	6	
WG-11222680-010423-M0-05			12:30			X	X	X	X	X	X	X	X	X	X	X	6	
WG-11222680-010423-M0-06			13:25			X	X	X	X	X	X	X	X	X	X	X	6	
WG-11222680-010423-M0-07			14:20			X	X	X	X	X	X	X	X	X	X	X	6	
WG-11222680-010423-M0-08			15:30			X	X	X	X	X	X	X	X	X	X	X	6	
WG-11222680-010423-M0-09			17:20			X	X	X	X	X	X	X	X	X	X	X	6	
WG-11222680-010423-M0-10			18:10			X	X	X	X	X	X	X	X	X	X	X	6	



C221453_COC

* RELINQUISHED BY: (Signature/Print)		Date: (YYYYMM)	Time	RECEIVED BY: (Signature/Print)	Date: (YYYYMM)	Time	# Jars used and not submitted	Lab Use Only	
Alexia MacPhee		26/04/2023	2:00	Alexia MacPhee	26/04/2023	15:48		Temperature (°C) on Receipt	CLUSTY (See note on 'Cooler')
								5/4/6, 2/3/3	☐ Yes ☒ No

UNLESS OTHERWISE ADVISED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS.

IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

100-403



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Chain Of Custody Record

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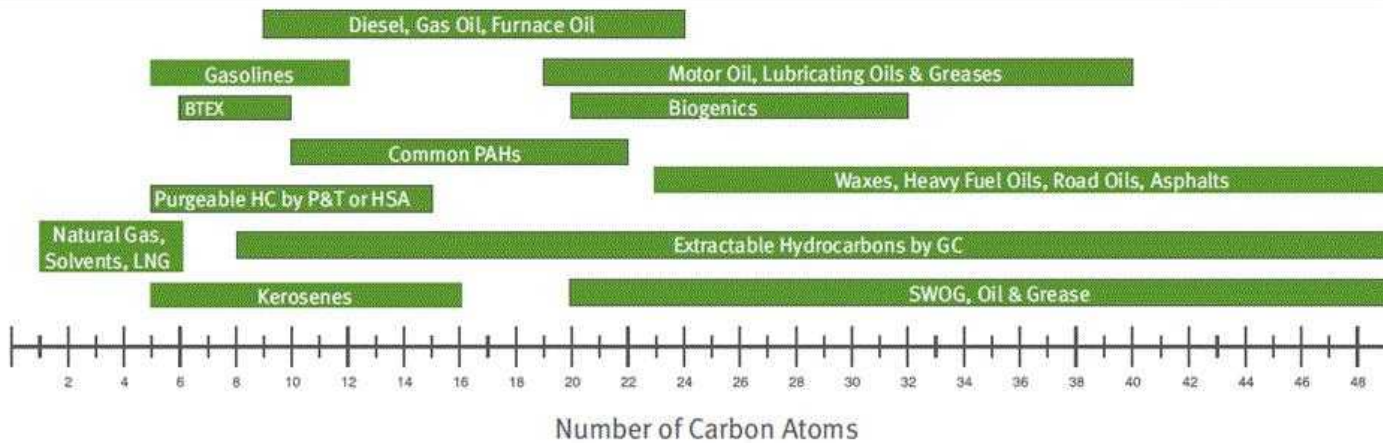
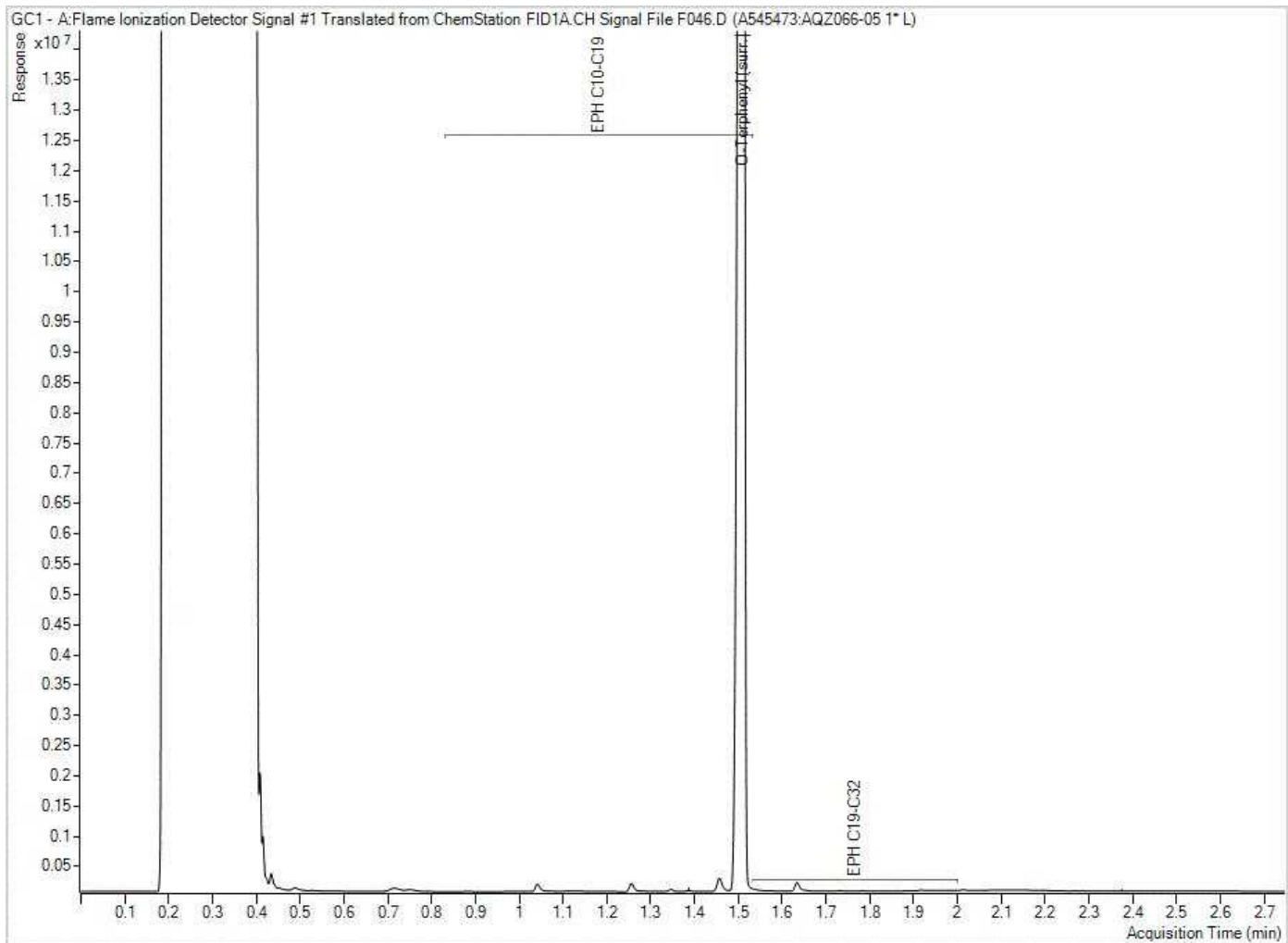
INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#153 GHG Limited	Company Name		Customer #	C10010	Bureau Veritas Job #	Bottle Order #
Contact Name	AP Invoices - 735	Contact Name	Alesse MacPhee	P.O. #	735-002648		
Address	453 PHILLIP STREET WATERLOO ON N2L 3X2	Address		Project #	11222680		
Phone	(519) 884-0510	Phone		Project Name	Upland EMP	Chain Of Custody Record	Project Manager
Fax	(519) 725-1394	Fax		Site #			Thomas Proulx
Email	APInvoices-735@ghg.com	Email	alesse.macphee@ghg.com; NationalEODSupport@bvna.com	Sampled By	CW/MJ		

Regulatory Criteria:	Special Instructions	ANALYSIS REQUESTED (PLEASE BE SPECIFIC)	Turnaround Time (TAT) Required
☒ CAN (W) (Leadmate) ☐ CCME ☒ BC Water Quality (Surface water) ☐ Other	All Samples were Field filtered and preserved as required - 2 coolers total	Conductivity, Cl, SO ₄ , NO ₃ , NO ₂ , NH ₄ ⁺ , TDS, Sp. Alc. Total Sulphide, Total H ₂ S, Un-ionized (as HOS) - based on total AMMONIUM-N (Total) LEPA/HEPA Total Metals with CV Hg TSS Orthophosphate BOD/COD Dissolved Hardness	Please provide advance notice for rush projects Regular (Standard) TAT: (will be applied if Rush TAT is not specified) Standard TAT = 3-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Storage/Fluores are +5 days - contact your Project Manager for details. Rush Confirmation Number: _____ (call lab for #)

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERTAS									
Sample/Bottle Label	Sample Location/Identification	Date Sampled	Time Sampled	Notes	Moist Field Filtered (Y/N)	Conductivity	Cl	SO ₄	NO ₃
1	MT - 11222680-010422-10-01	16:50		water					
2	WS - 11222680-010422-10-01	16:50							
3	WS - 11222680-010422-10-02	18:20							
4	WL - 11222680-010422-10-01	16:10							
5	WL - 11222680-010422-10-02	16:20							

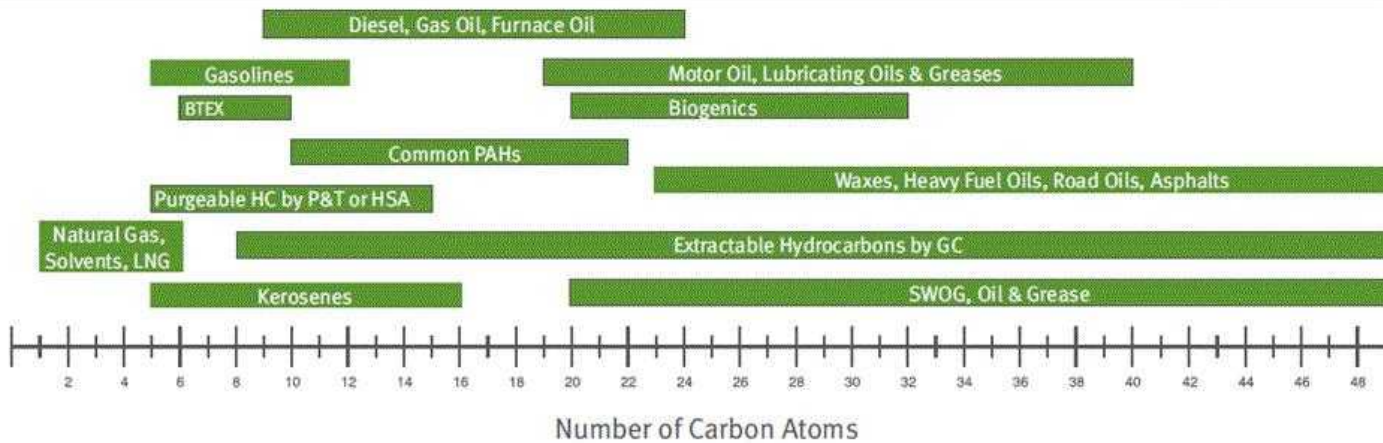
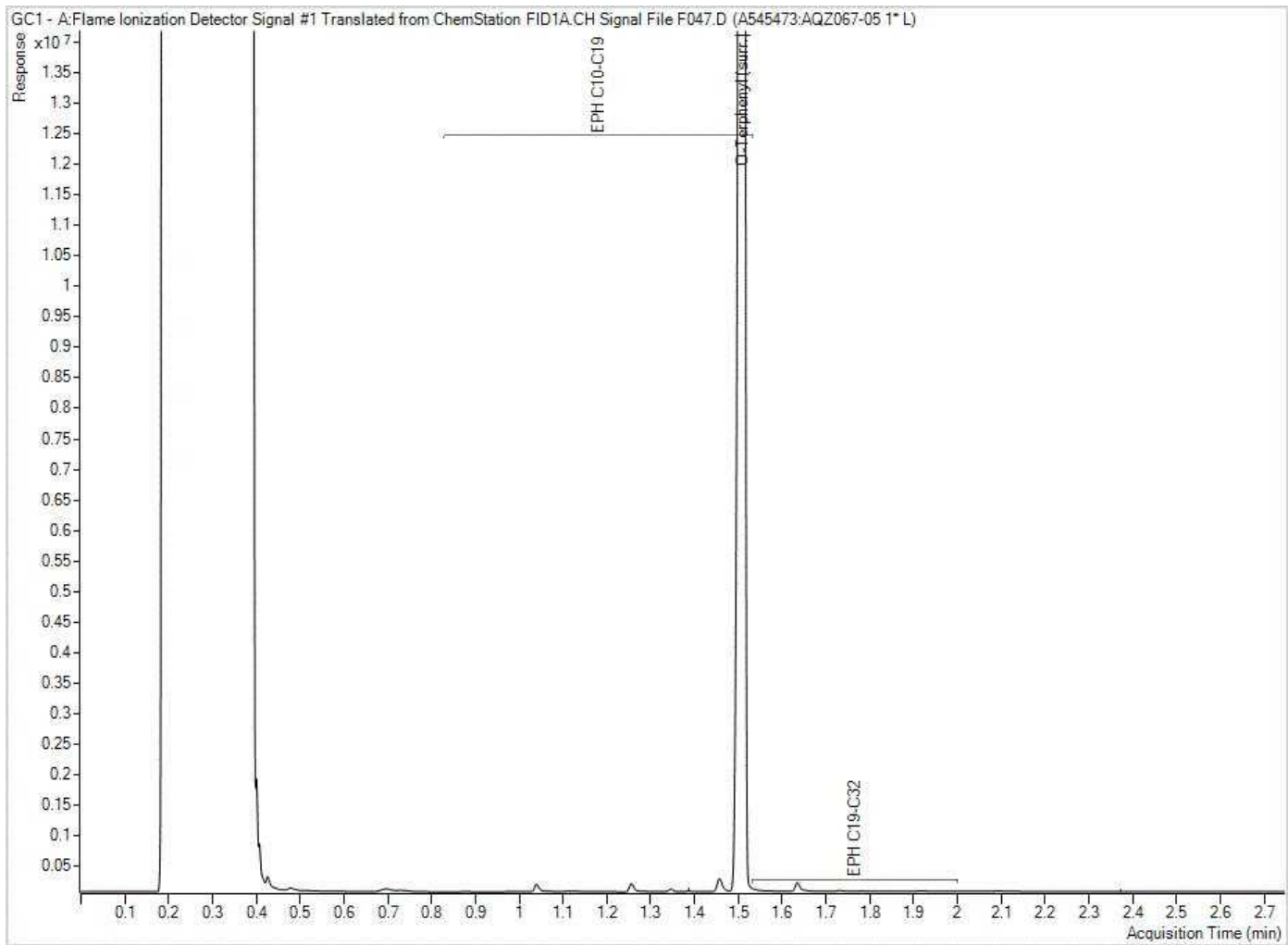
RELINQUISHED BY: (Signature/Print)	Date (YYMMDD)	Time	RECEIVED BY: (Signature/Print)	Date (YYMMDD)	Time	Temp (°C) on Receipt	Lab Use Only
Helena Zentgraf	22/04/01	11:00	Helena Zentgraf	20/04/02	13:48	5/4/6, 2/3/3	Quality Seal intact on Container? ☐ Yes ☒ No

EPH in Water when PAH required Chromatogram



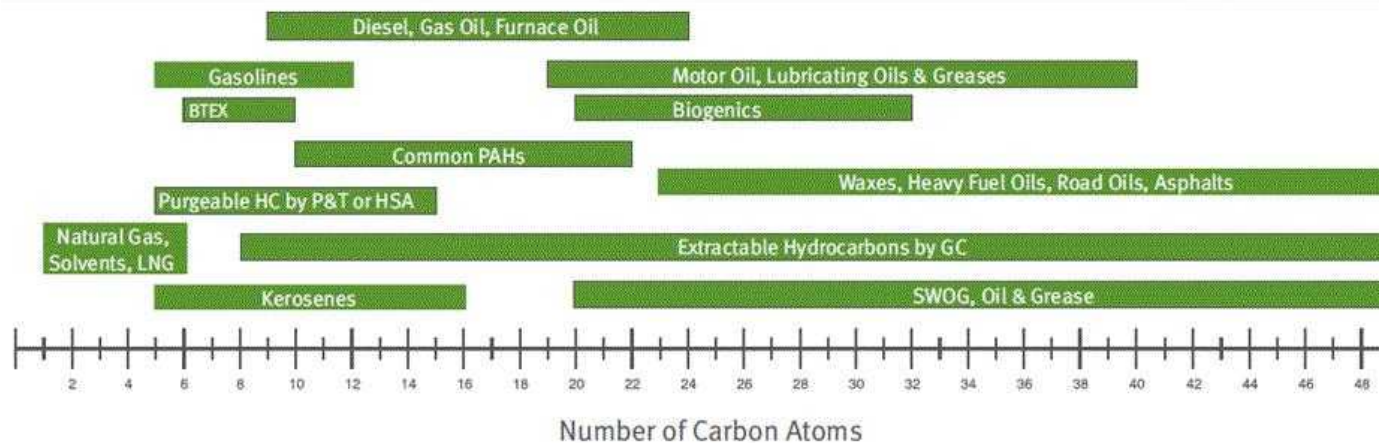
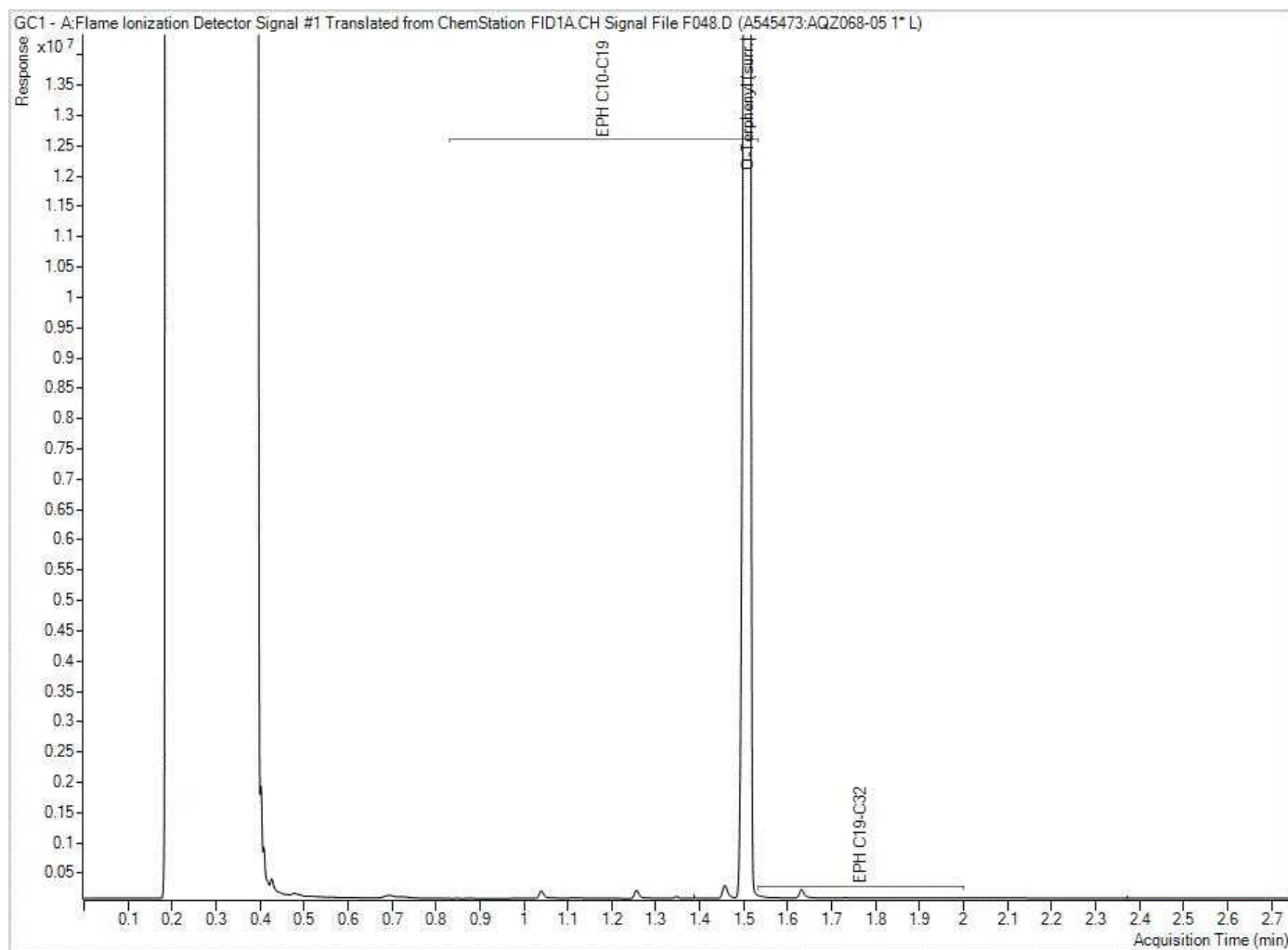
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



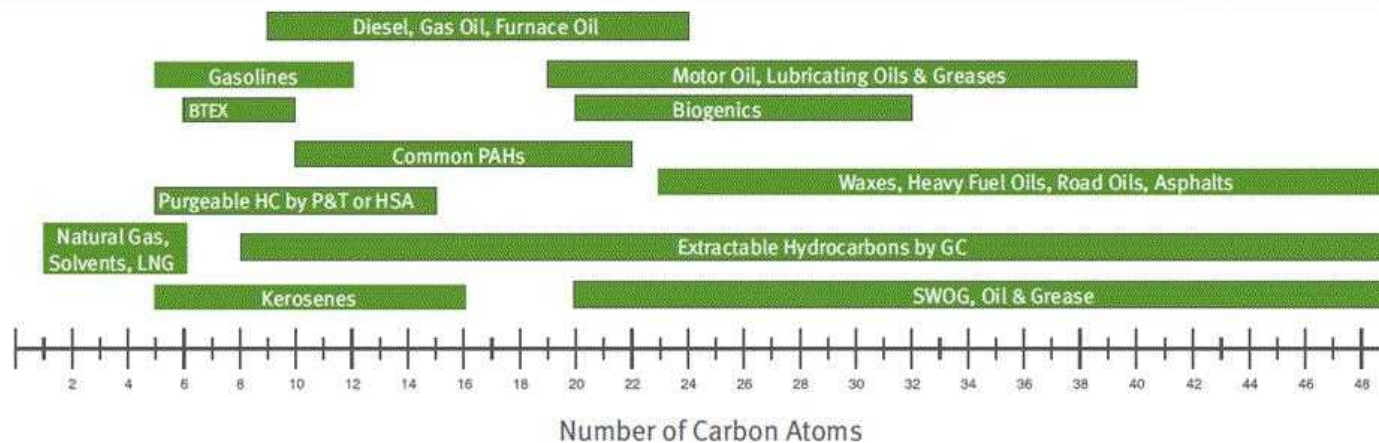
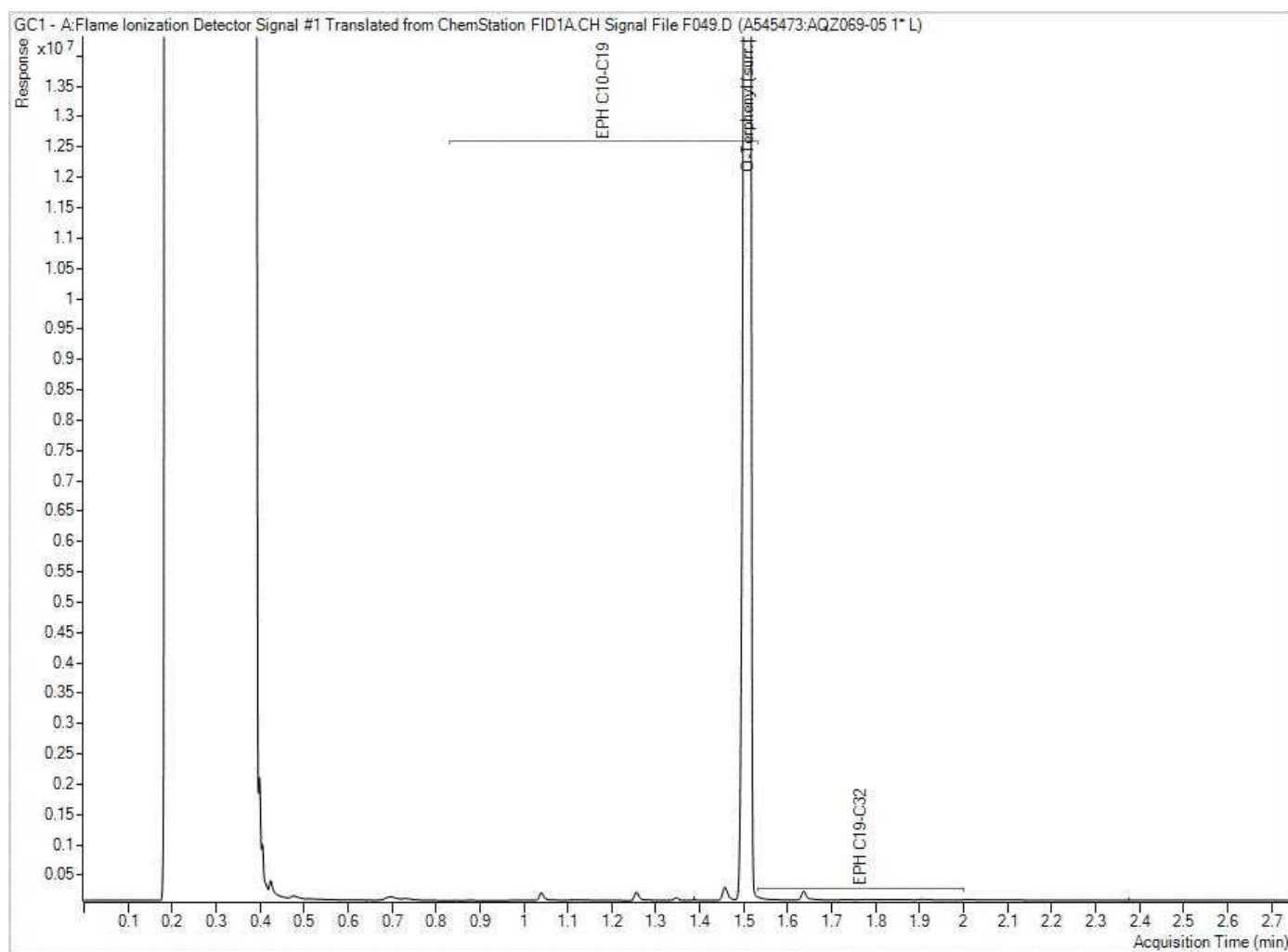
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EPH in Water when PAH required Chromatogram



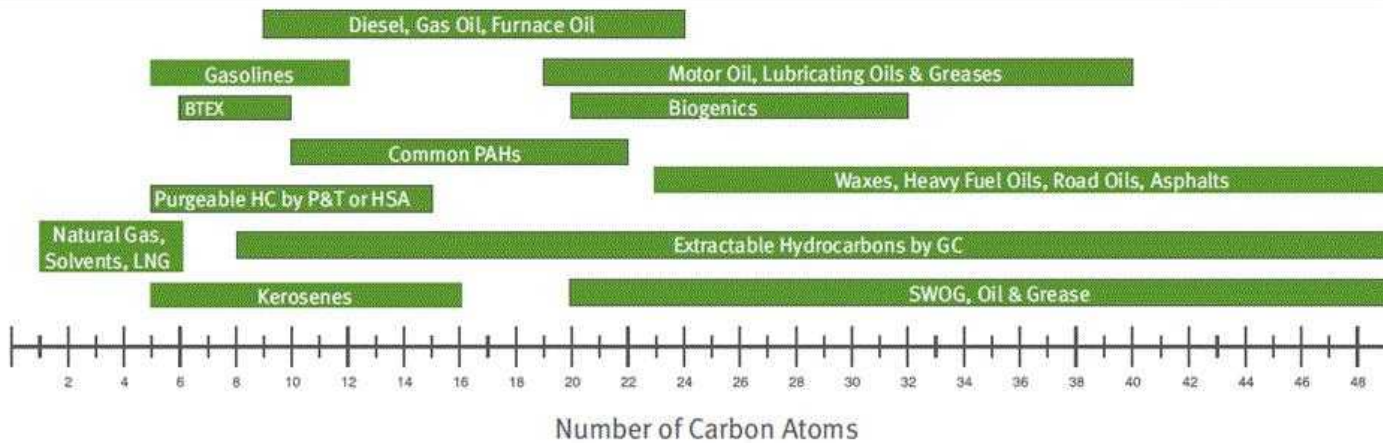
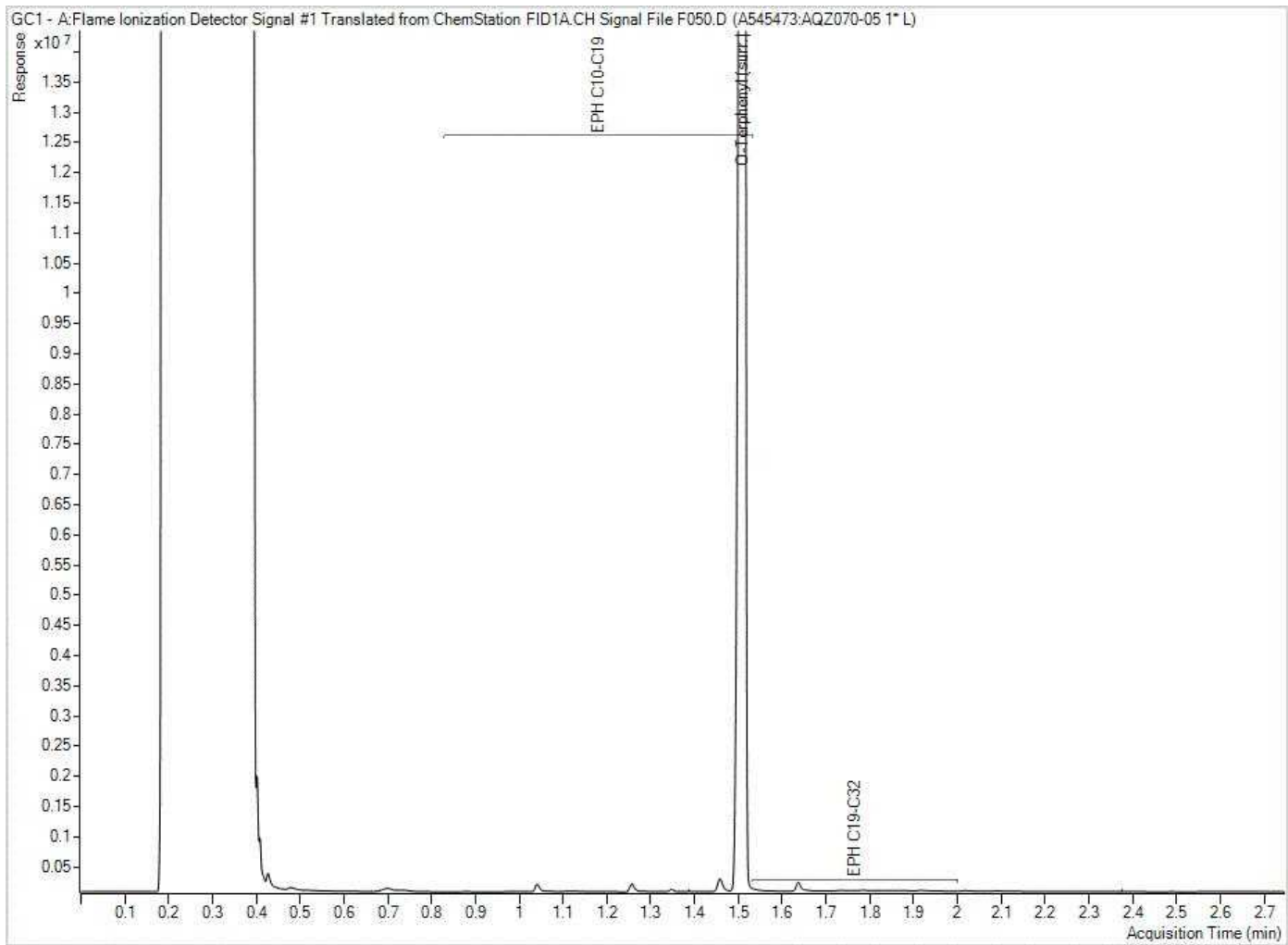
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EPH in Water when PAH required Chromatogram



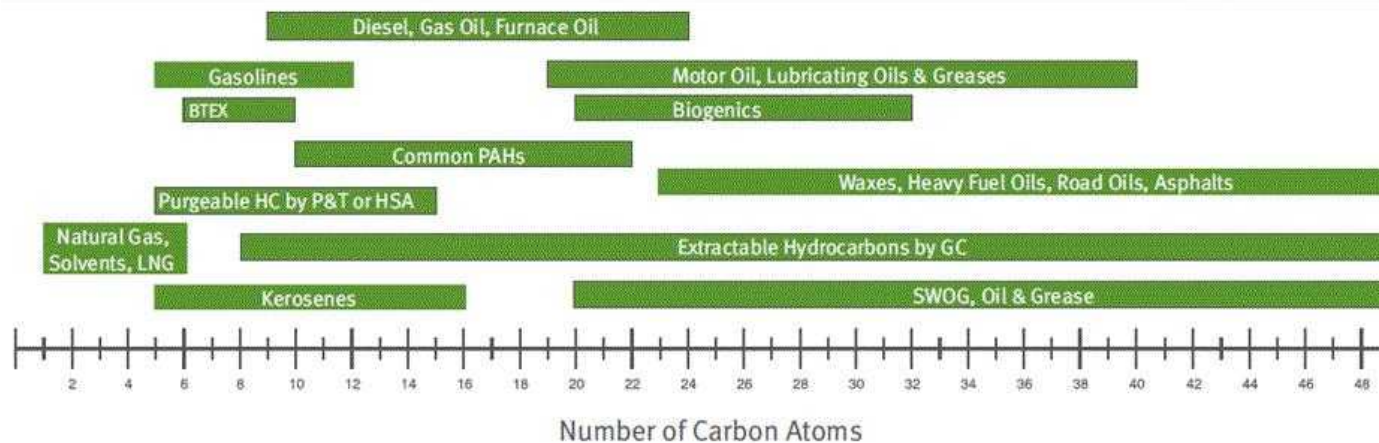
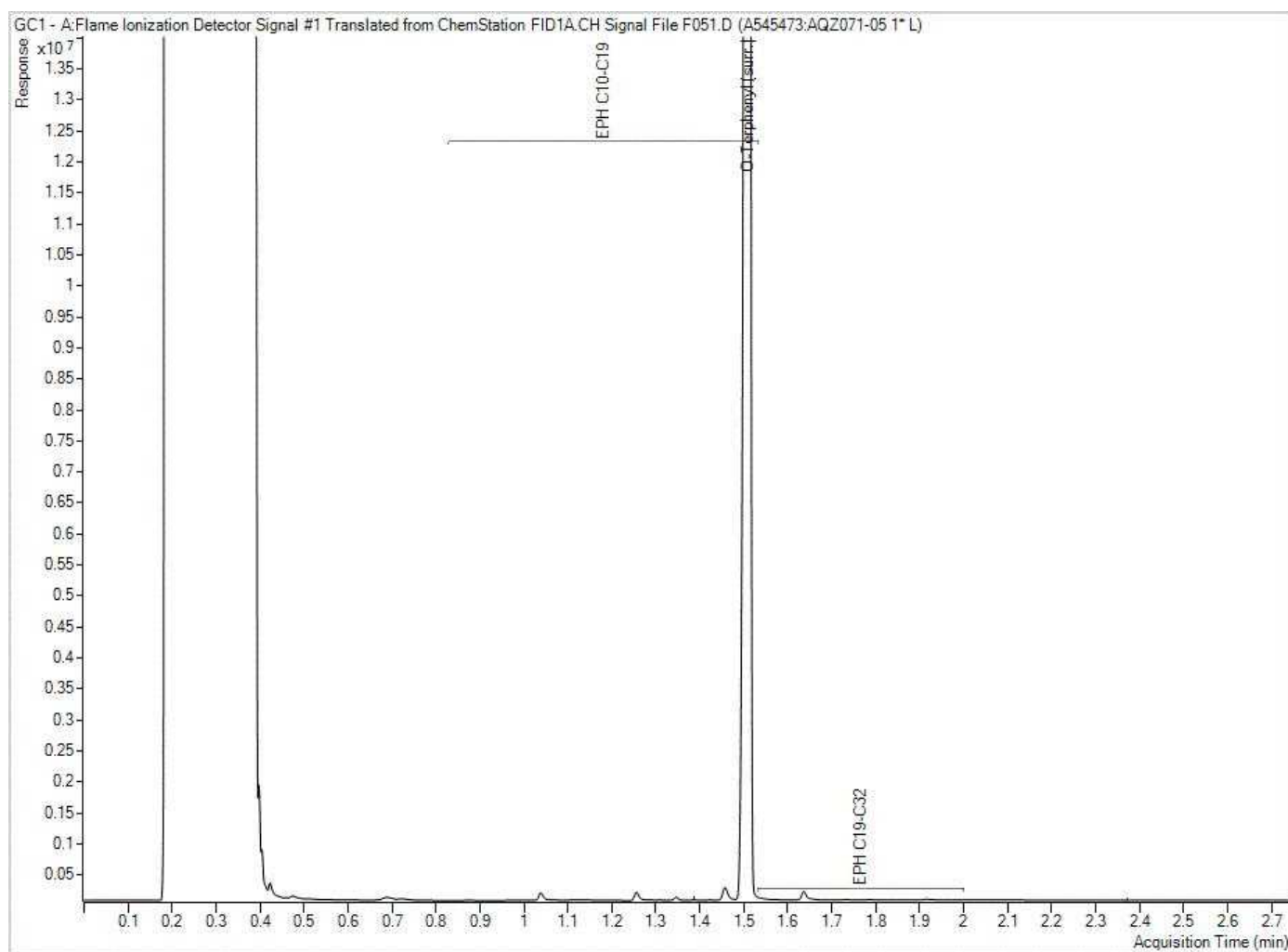
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



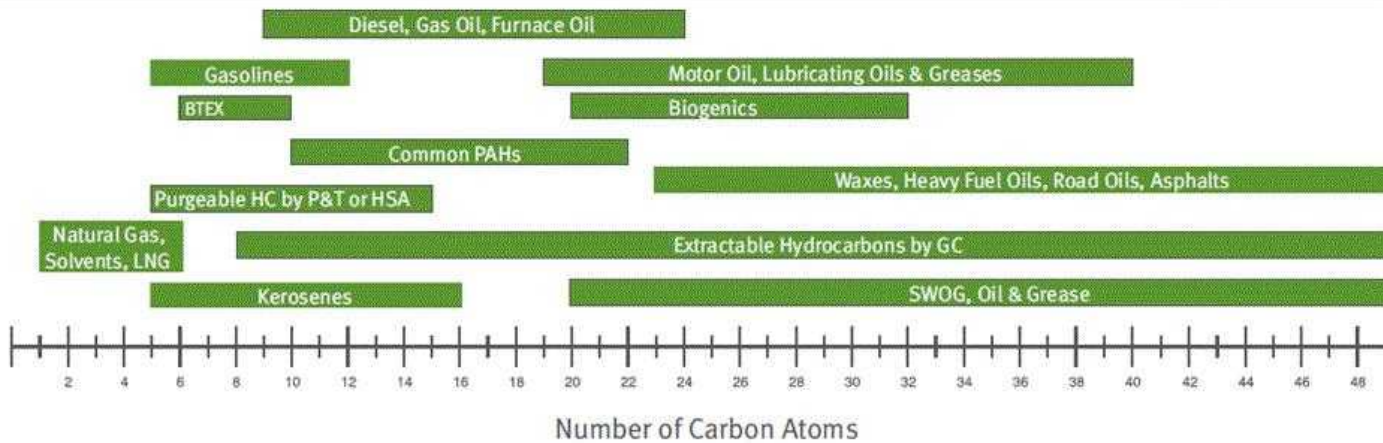
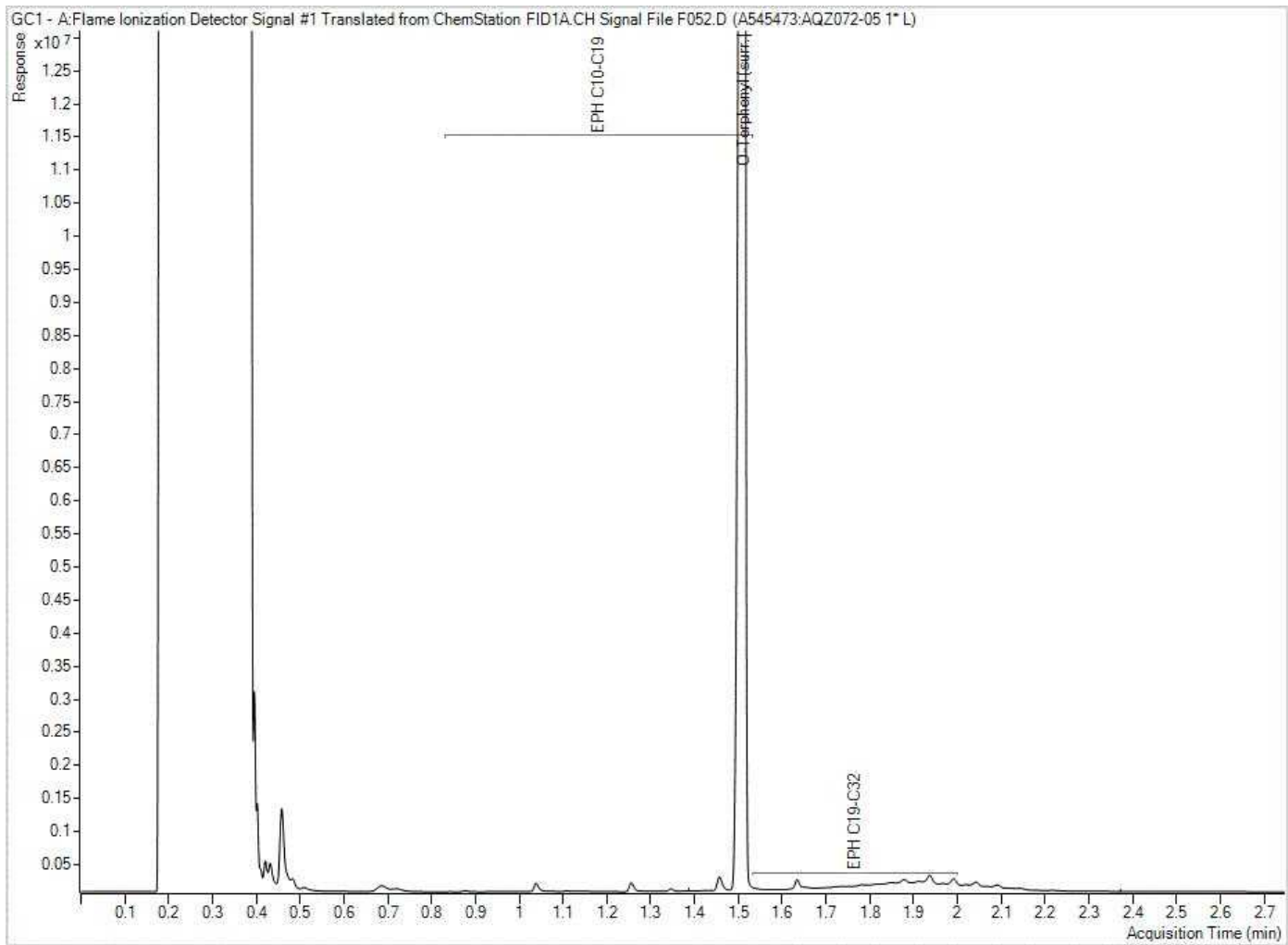
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EPH in Water when PAH required Chromatogram



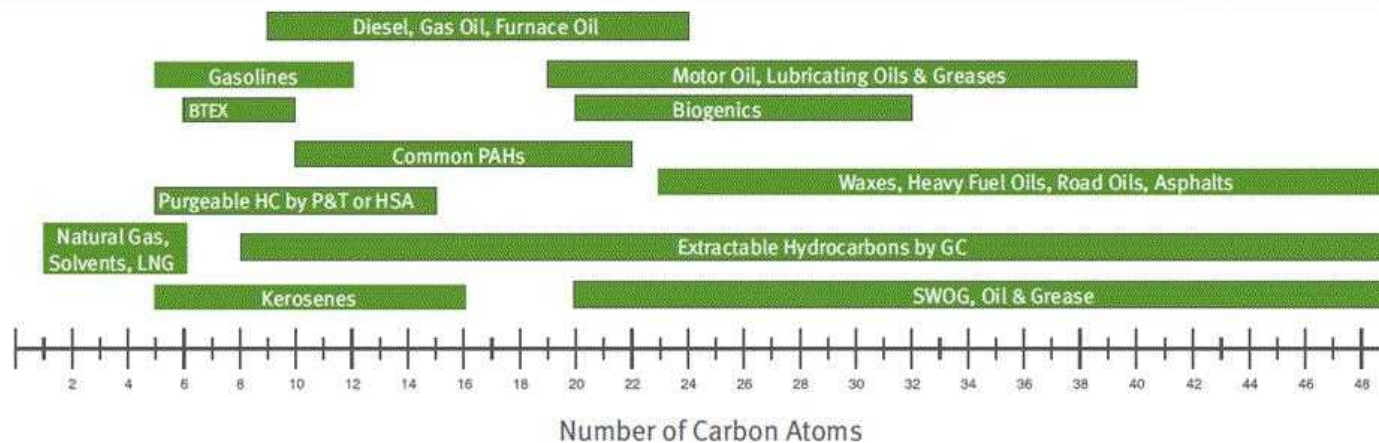
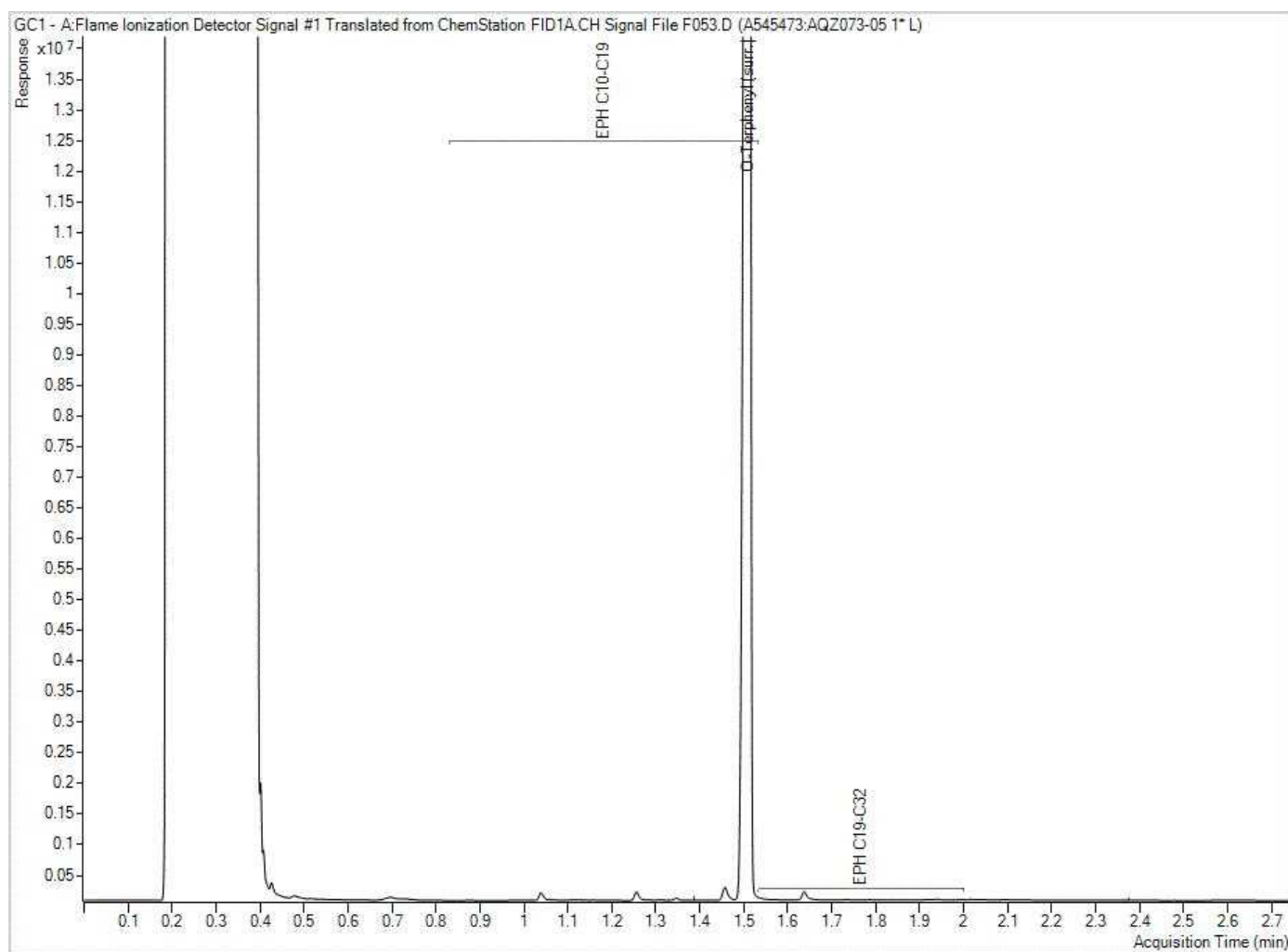
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EPH in Water when PAH required Chromatogram



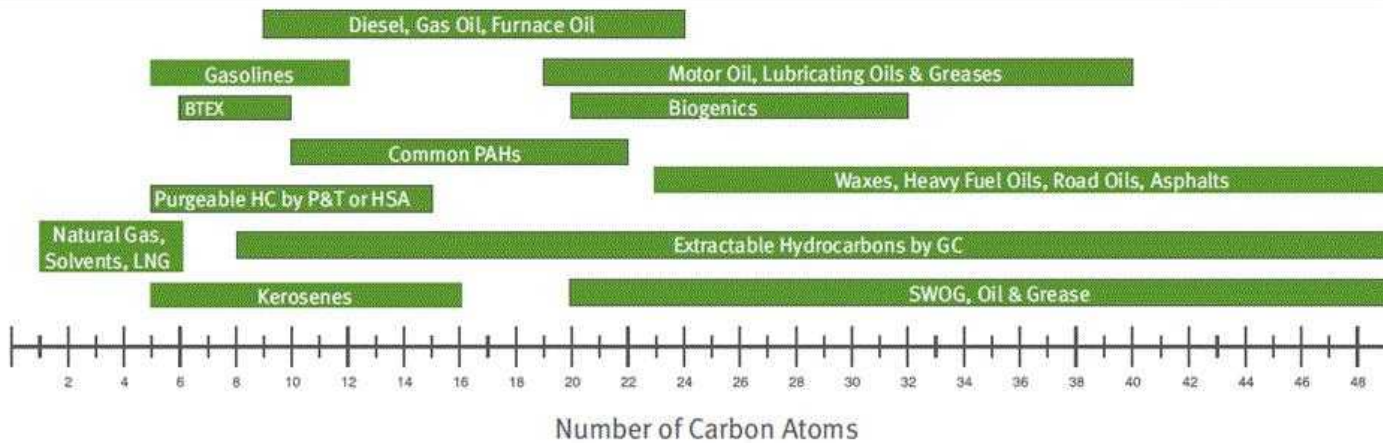
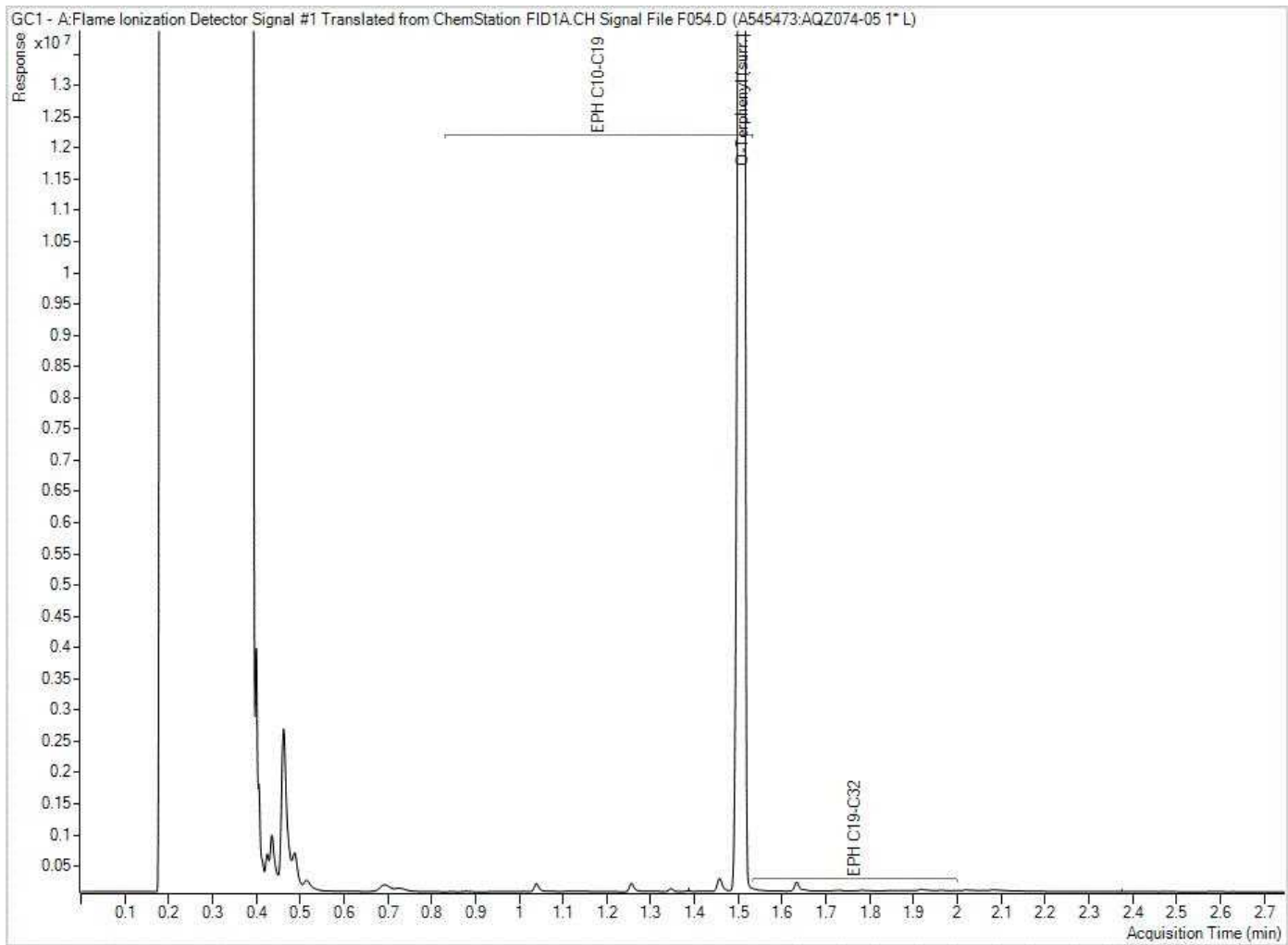
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EPH in Water when PAH required Chromatogram



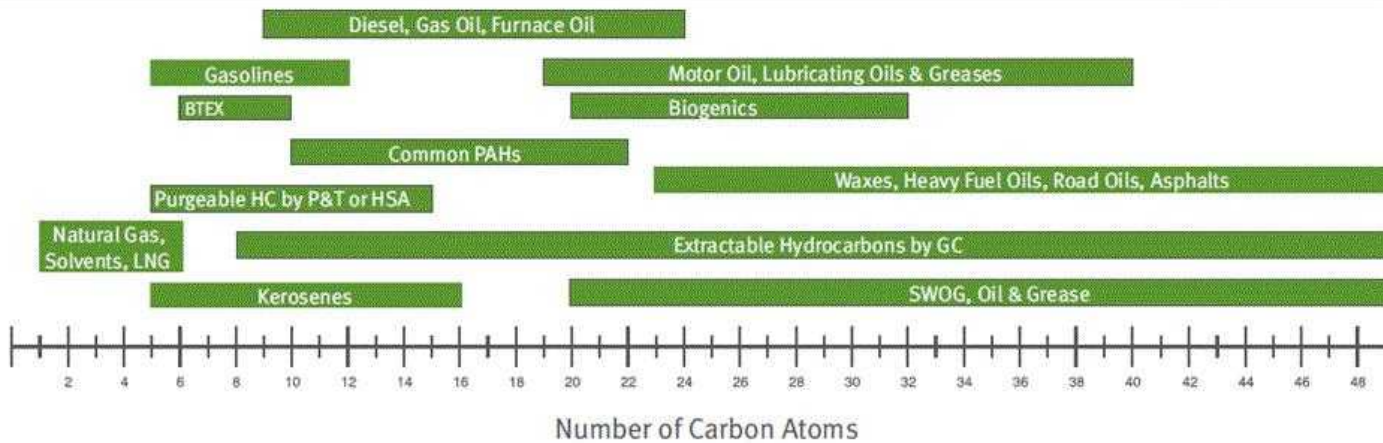
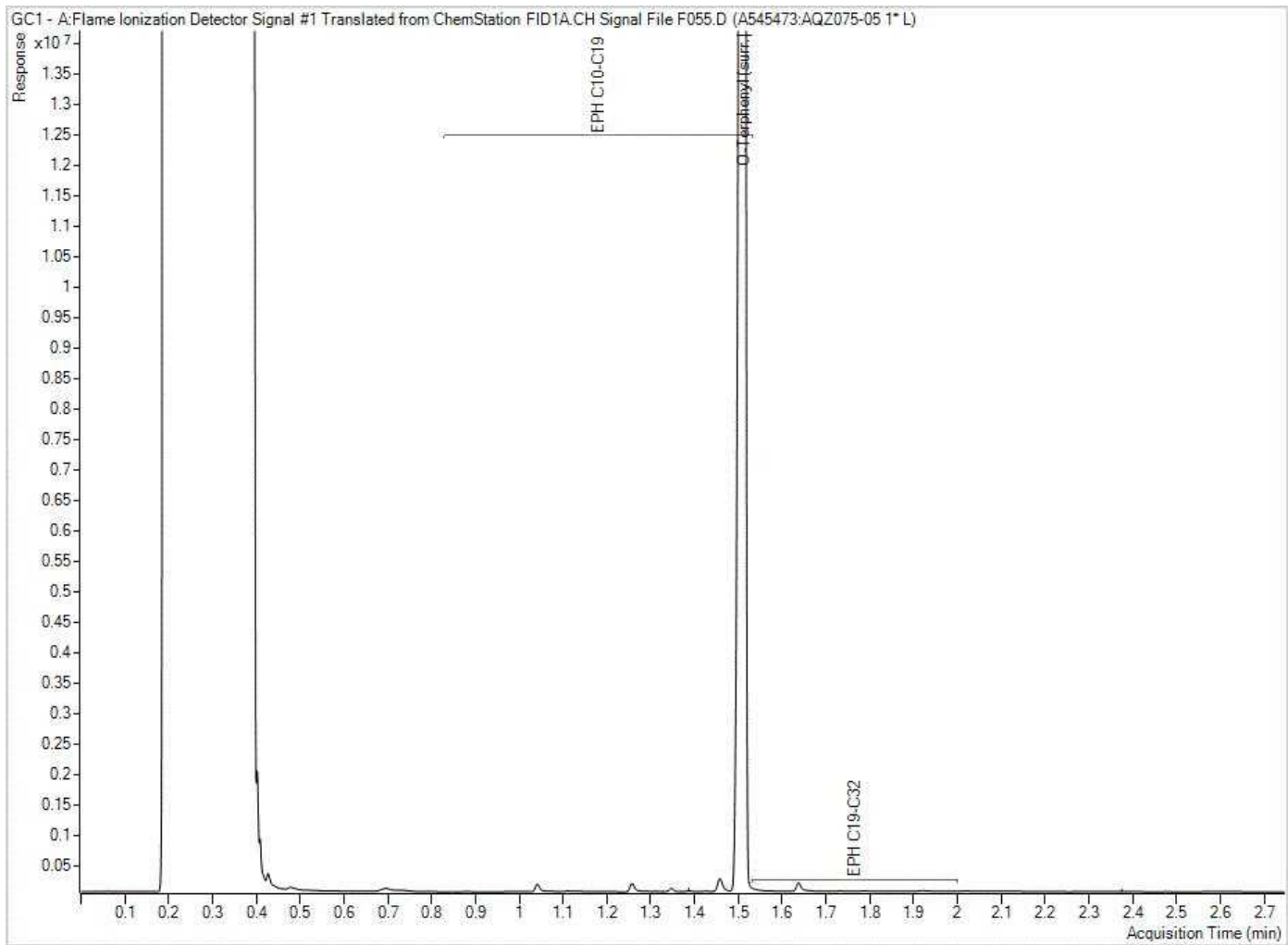
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



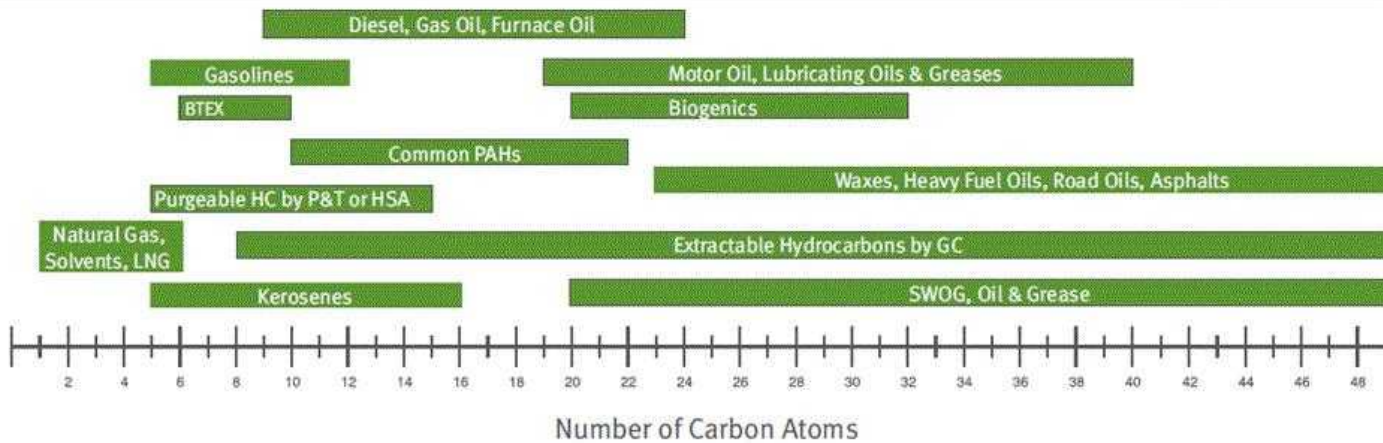
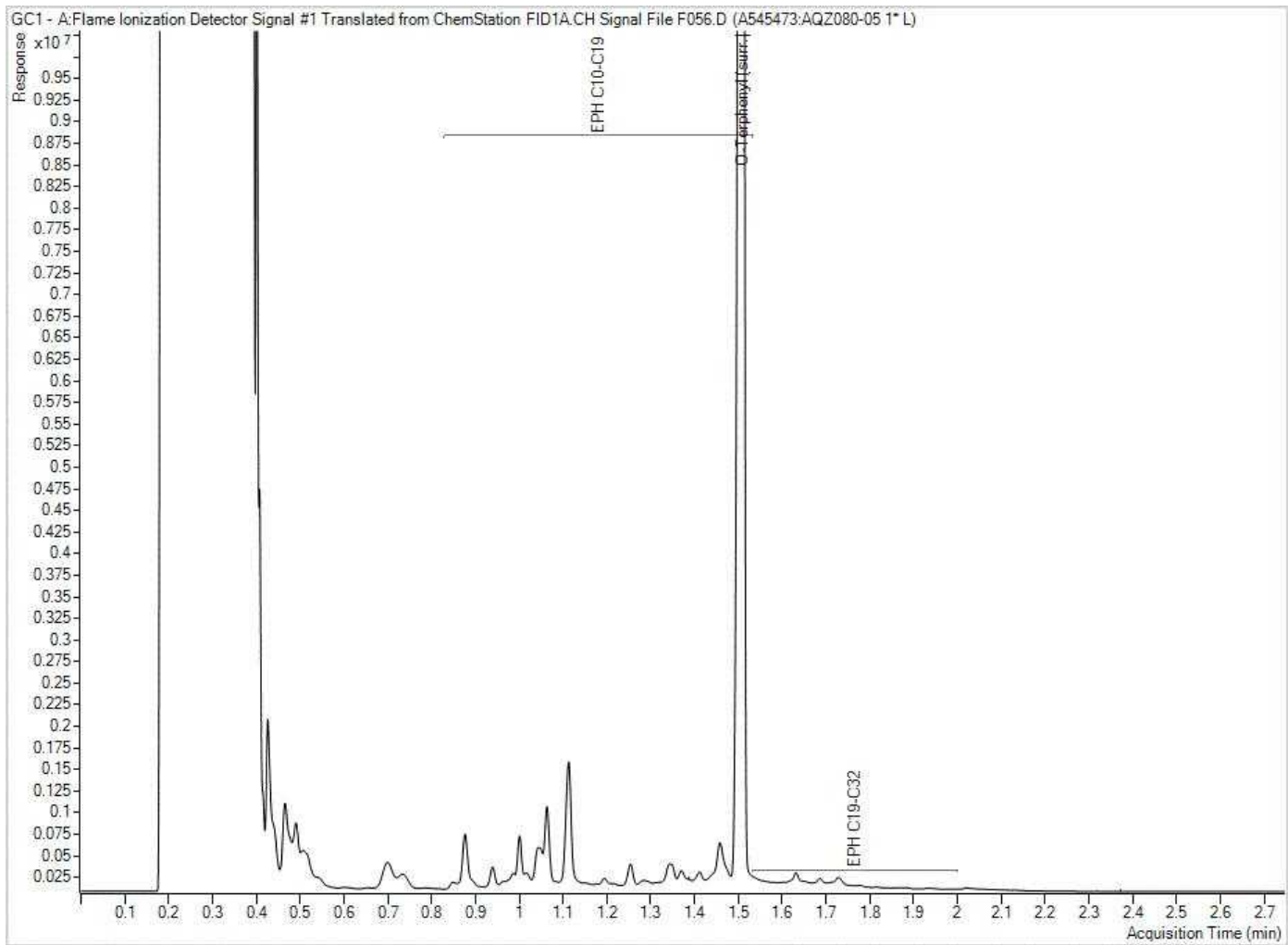
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EPH in Water when PAH required Chromatogram



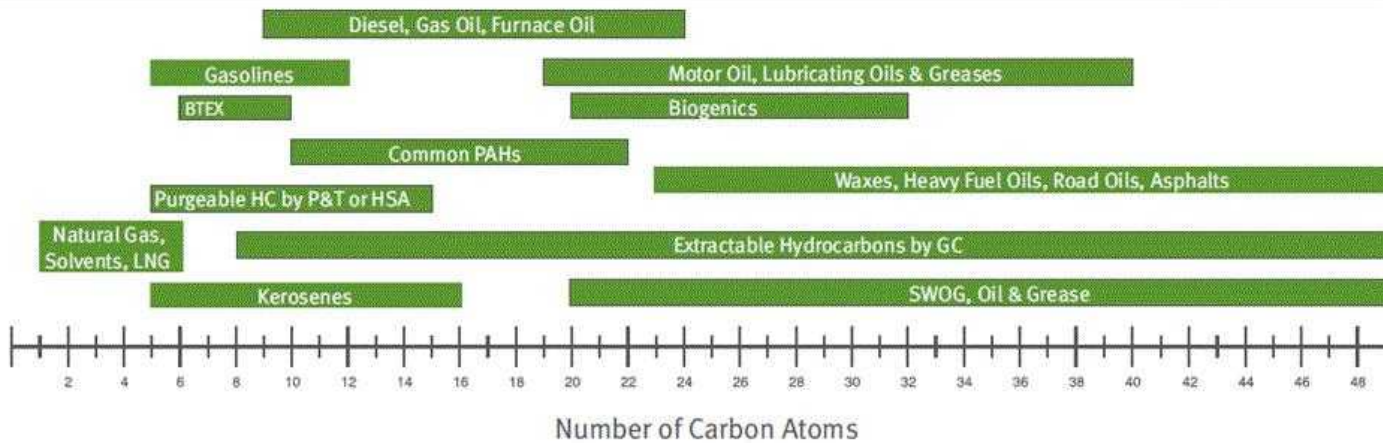
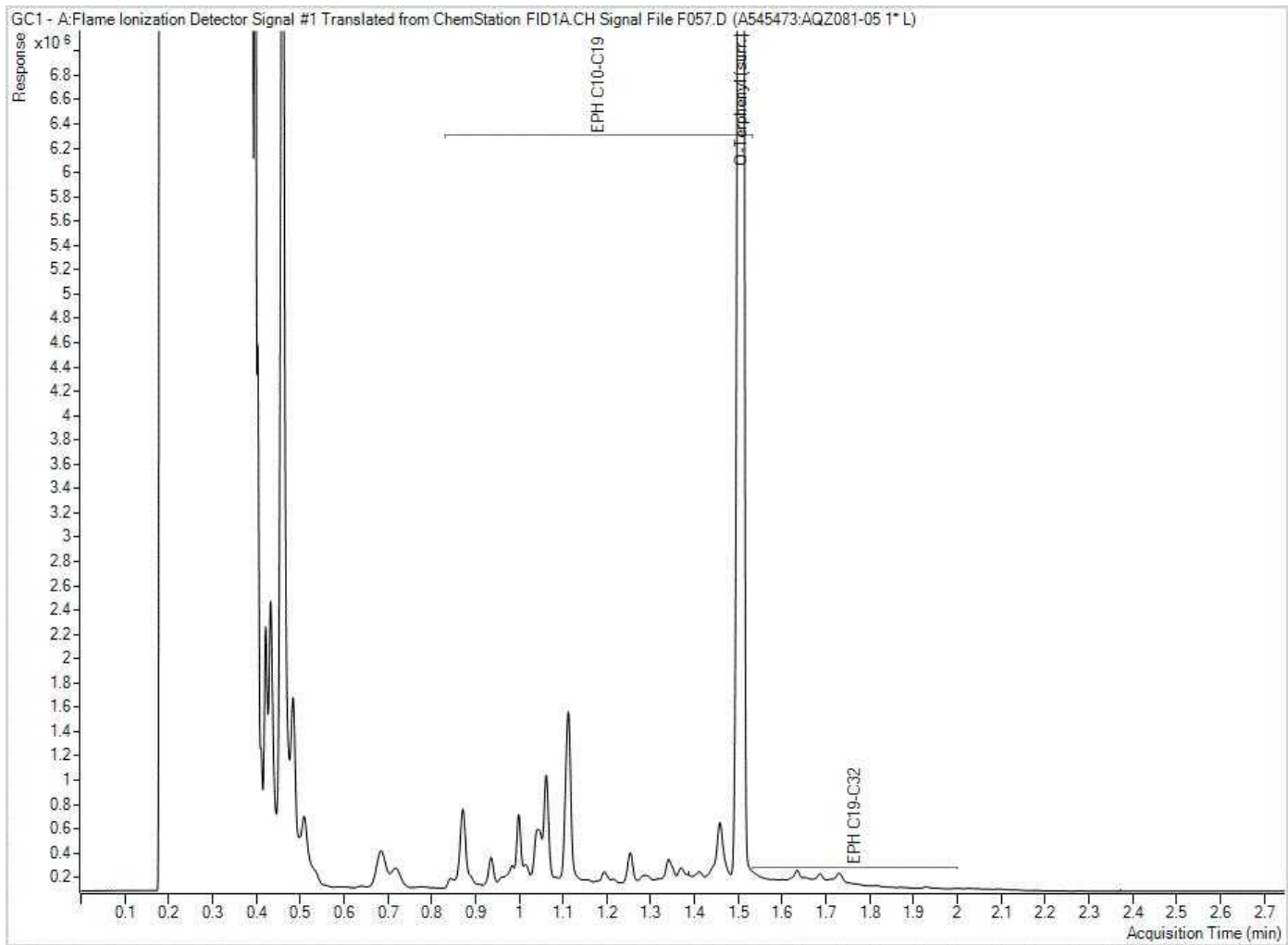
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EPH in Water when PAH required Chromatogram



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EPH in Water when PAH required Chromatogram



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Facility ID	Landfill ID	Sample Name	Location	Date	Time	Type	Matrix	Parent Sample Name	WaterDepth	DepthUnit	DryYasko	Notes	Temperature	Temperature Unit	Field pH (s.u.)	ORP	ORP units	Conductivity	Conductivity Unit	Turbidity (NTU)	Dissolved Oxygen (DO)	DO Units	TDS	TDS Units
1088877000	NEW	WG-11222680-220622-CXW-01	MW6-17	06/22/22	11:30	N	WG		16.06	m BTOR	N	Clear, no odour, sampled recharge	10.81	deg C	6.97	0	millivolts	425	uS/cm	1.06			276	mg/L
1088877000	NEW	WG-11222680-220622-CXW-02	MW11-19	06/22/22	11:40	N	WG		47.108	m BTOR	N	Turbid, fine silt, no odour	14.68	deg C	7.38	352	millivolts	211	uS/cm	319			137	mg/L
1088877000	NEW	WG-11222680-220622-CXW-03	MW10-17	06/22/22	12:30	N	WG		41.514	m BTOR	N	Clear, no odour	12.99	deg C	7.85	324	millivolts	135	uS/cm	11.1			87	mg/L
1088877000	NEW	WG-11222680-220622-CXW-04	MW4A-15	06/22/22	13:40	N	WG		3.231	m BTOR	N	Clear, no odour	10.22	deg C	6.81	361	millivolts	256	uS/cm	2.3			167	mg/L
1088877000	NEW	WG-11222680-220622-CXW-05	MW4B-15	06/22/22	13:20	N	WG		8.431	m BTOR	N	Clear, no odour	9.46	deg C	6.79	373	millivolts	251	uS/cm	2.6			163	mg/L
1088877000	NEW	WG-11222680-220622-CXW-06	MW2-14	06/22/22	15:25	N	WG		16.962	m BTOR	N	Clear, no odour	8.95	deg C	6.86	263	millivolts	133	uS/cm	1.1			67	mg/L
1088877000	NEW	WG-11222680-220622-CXW-07	MW2A-16	06/22/22	15:50	N	WG		18.605	m BTOR	N	Clear, no odour	13.95	deg C	8.40	294	millivolts	65	uS/cm	5.7			42	mg/L
1088877000	NEW	WG-11222680-220622-CXW-08	MW2A-16	06/22/22	16:55	FD	WG	WG-11222680-220622-CXW-07	18.605	m BTOR	N	Clear, no odour	13.95	deg C	8.40	294	millivolts	65	uS/cm	5.7			42	mg/L
1088877000	NEW	WG-11222680-220622-CXW-09	MW1-14	06/22/22	16:50	N	WG		10.675	m BTOR	N	Clear, no odour	10.47	deg C	7.26	261	millivolts	103	uS/cm	70.1			68	mg/L
1088877000	NEW	WG-11222680-220622-CXW-10	MW6-17	06/23/22	08:30	N	WG		23.636	m BTOR	N	Clear, no odour	3.77	deg C	7.56	272	millivolts	58	uS/cm	11.2			38	mg/L
1088877000	NEW	WL-11222680-220622-CXW-04	SDS-21	06/23/22	11:45	N	WG		16.10		N	Black colour, black particulate, semi-transparent, strong odour, taken from leachate system	16.10	deg C	6.85	-333	millivolts	453	uS/cm	68.2			296	mg/L
1088877000	NEW	WL-11222680-220622-CXW-05	LDS	06/23/22	17:20	N	WG		20.021	m BTOR	N	Milky colour, slight turbid, slight odour	19.31	deg C	7.76	-45	millivolts	352	uS/cm	361			2.25	mg/L
1088877000	NEW	TLF-220622	TLF	06/22/22	7:00	N	WL				Y	No sample, dry, no discharge												
1088877000	NEW	East Surface Water Ditch-220622	East SW Ditch	06/22/22	7:00	N	WS				Y	No sample, dry												
1088877000	NEW	West Surface Water Ditch-220622	West SW Ditch	06/22/22	7:00	N	WS				Y	No sample, dry												
1088877000	NEW	WS-11222680-220622-CXW-01	SW15-02	06/23/22	13:05	N	WS				WS	Clear, no odour	15.15	deg C	7.39	-54	millivolts	56	uS/cm	8.8	9.66	mg/L	36	mg/L
1088877000	NEW	WS-11222680-220622-CXW-02	SW15-01	06/23/22	13:40	N	WS				WS	Clear, no odour	14.21	deg C	7.76	8	millivolts	52	uS/cm	1.9	14.53	mg/L	34	mg/L
1088877000	NEW	Rise Gauge-220622	Rise Gauge	06/23/22	7:00	N	WS		2.14	m BTOR	N	Measured from top of gauge												
1088877000	NEW	WG-11222680-220622-CXW-11	MW3-14	06/23/22	12:30	N	WG		15.284	m BTOR	N	Clear, no odour	8.25	deg C	7.25	-146	millivolts	82	uS/cm	4.6			54	mg/L
1088877000	NEW	WG-11222680-220622-CXW-12	Field Blank	06/23/22	12:35	FB	WG03				N	Data not collected, monthly average to be used in AnnRpt												
1088877000	NEW	Motor Lake-220622	Motor Lake	06/23/22	7:00	N	WG				N													

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640
Your Project #: 11222680
Site#: Groundwater
Site Location: UPLAND EMP
Your C.O.C. #: 666638-01-01

Report Date: 2022/07/06

Report #: R3195965

Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT**BUREAU VERITAS JOB #: C244102****Received: 2022/06/23, 08:40**

Sample Matrix: Ground Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	4	N/A	2022/06/23	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	4	N/A	2022/06/23	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO ₄ -E m
Conductivity @25C	4	N/A	2022/06/23	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H ₂ S) (1)	3	N/A	2022/06/27		Auto Calc
Sulphide (as H ₂ S) (1)	1	N/A	2022/06/28		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc (1)	3	N/A	2022/06/27		
Un-ionized Hydrogen Sulphide as S Calc (1)	1	N/A	2022/06/28		
Hardness (calculated as CaCO ₃)	4	N/A	2022/06/25	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (2)	4	2022/06/23	2022/06/24	AB SOP-00084	BCMOE BCLM Oct2013 m
EPH in Water when PAH required	4	2022/06/23	2022/06/24	BBY8SOP-00029	BCMOE BCLM Sep2017 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	4	N/A	2022/06/25	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (2)	2	N/A	2022/06/24	BBY7SOP-00002	EPA 6020b R2 m
Elements by CRC ICPMS (dissolved) (2)	2	N/A	2022/06/25	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	4	N/A	2022/06/23	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate + Nitrite (N)	4	N/A	2022/06/23	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrite (N) by CFA	4	N/A	2022/06/23	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	4	N/A	2022/06/24	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	2	2022/06/23	2022/06/24	BBY8SOP-00021	BCMOE BCLM Jul2017m
PAH in Water by GC/MS (SIM)	2	2022/06/23	2022/06/25	BBY8SOP-00021	BCMOE BCLM Jul2017m
Filter and HNO ₃ Preserve for Metals	4	N/A	2022/06/23	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (3)	4	N/A	2022/06/23	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	3	N/A	2022/06/27	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Sulphide (1)	1	N/A	2022/06/28	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Dissolved Solids (Filt. Residue)	4	2022/06/28	2022/06/29	BBY6SOP-00033	SM 23 2540 C m
EPH less PAH in Water by GC/FID (4)	4	N/A	2022/06/27	BBY WI-00033	Auto Calc
Field pH	4	N/A	2022/06/23		
Field Temperature	4	N/A	2022/06/23		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.



Attention: Aïresse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640
Your Project #: 11222680
Site#: Groundwater
Site Location: UPLAND EMP
Your C.O.C. #: 666638-01-01

Report Date: 2022/07/06

Report #: R3195965

Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C244102

Received: 2022/06/23, 08:40

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.

(3) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

(4) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Thomas Pinchin, Project Solutions Representative

Email: Thomas.Pinchin@bureauveritas.com

Phone# (604) 734 7276

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU
VERITAS

Bureau Veritas Job #: C244102

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXN

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		AVQ916	AVQ916			
Sampling Date		2022/06/22 11:40	2022/06/22 11:40			
COC Number		666638-01-01	666638-01-01			
	UNITS	WG-11222680-220622 -CXW-02	WG-11222680-220622 -CXW-02 Lab-Dup	RDL	MDL	QC Batch

ANIONS						
Nitrite (N)	mg/L	<0.0050	N/A	0.0050	0.0050	A620955
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.601	N/A	0.020	N/A	A620059
Sulphide (as H2S)	mg/L	0.098	N/A	0.077	N/A	A619662
Field Parameters						
Field pH	pH	7.38	N/A	N/A	N/A	ONSITE
Field Temperature	°C	14.69	N/A	N/A	N/A	ONSITE
Misc. Inorganics						
Conductivity	uS/cm	200	210	2.0	N/A	A620923
Total Dissolved Solids	mg/L	120 (1)	N/A	13	N/A	A625496
Anions						
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	1.0	N/A	A620922
Alkalinity (Total as CaCO3)	mg/L	77 (2)	78	1.0	N/A	A620922
Bicarbonate (HCO3)	mg/L	93	95	1.0	N/A	A620922
Carbonate (CO3)	mg/L	<1.0	<1.0	1.0	N/A	A620922
Hydroxide (OH)	mg/L	<1.0	<1.0	1.0	N/A	A620922
Total Sulphide	mg/L	0.092 (3)	<0.072	0.072	N/A	A625621
Chloride (Cl)	mg/L	7.7	N/A	1.0	N/A	A620723
Sulphate (SO4)	mg/L	12	N/A	1.0	N/A	A620723
Nutrients						
Total Ammonia (N)	mg/L	<0.015	<0.015	0.015	0.0040	A620347
Orthophosphate (P)	mg/L	0.014	N/A	0.0030	0.0030	A620578
Nitrate plus Nitrite (N)	mg/L	0.601	N/A	0.020	0.020	A620954
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) RDL raised due to limited initial sample amount. (2) Matrix spike exceeds acceptance limits due to suspected matrix interference. (3) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.						



BUREAU
VERITAS

Bureau Veritas Job #: C244102
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CXN

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		AVQ917	AVQ918	AVQ919			
Sampling Date		2022/06/22 12:30	2022/06/22 13:40	2022/06/22 13:20			
COC Number		666638-01-01	666638-01-01	666638-01-01			
	UNITS	WG-11222680-220622 -CXW-03	WG-11222680-220622 -CXW-04	WG-11222680-220622 -CXW-05	RDL	MDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A620955
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.514	1.93	1.89	0.020	N/A	A620059
Sulphide (as H2S)	mg/L	<0.0020	<0.0020	<0.0020	0.0020	N/A	A619662
Field Parameters							
Field pH	pH	7.85	6.81	6.79	N/A	N/A	ONSITE
Field Temperature	°C	12.99	10.22	9.46	N/A	N/A	ONSITE
Misc. Inorganics							
Conductivity	uS/cm	130	250	250	2.0	N/A	A620923
Total Dissolved Solids	mg/L	88	140	150	10	N/A	A625496
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A620922
Alkalinity (Total as CaCO3)	mg/L	53	73	69	1.0	N/A	A620922
Bicarbonate (HCO3)	mg/L	65	89	84	1.0	N/A	A620922
Carbonate (CO3)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A620922
Hydroxide (OH)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A620922
Total Sulphide	mg/L	<0.0018	<0.0018	<0.0018	0.0018	N/A	A623567
Chloride (Cl)	mg/L	16	16	15	1.0	N/A	A620723
Sulphate (SO4)	mg/L	4.9	20	19	1.0	N/A	A620723
Nutrients							
Total Ammonia (N)	mg/L	<0.015	<0.015	<0.015	0.015	0.0040	A620347
Orthophosphate (P)	mg/L	0.012	0.0074	0.0076	0.0030	0.0030	A620578
Nitrate plus Nitrite (N)	mg/L	0.514	1.93	1.89	0.020	0.020	A620954
RDL = Reportable Detection Limit							
N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C244102

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXN

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		AVQ919			
Sampling Date		2022/06/22 13:20			
COC Number		666638-01-01			
	UNITS	WG-11222680-220622 -CXW-05 Lab-Dup	RDL	MDL	QC Batch

Anions					
Total Sulphide	mg/L	<0.0018	0.0018	N/A	A623567
RDL = Reportable Detection Limit					
Lab-Dup = Laboratory Initiated Duplicate					
N/A = Not Applicable					



BUREAU
VERITAS

Bureau Veritas Job #: C244102

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXN

SEMIVOLATILE ORGANICS BY GC-MS (GROUND WATER)

Bureau Veritas ID		AVQ916	AVQ917	AVQ918			
Sampling Date		2022/06/22 11:40	2022/06/22 12:30	2022/06/22 13:40			
COC Number		666638-01-01	666638-01-01	666638-01-01			
	UNITS	WG-11222680-220622 -CXW-02	WG-11222680-220622 -CXW-03	WG-11222680-220622 -CXW-04	RDL	MDL	QC Batch
Polycyclic Aromatics							
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	0.050	A620433
Acenaphthene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A620433
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A620433
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A620433
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A620433
Acridine	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A620433
Fluoranthene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A620433
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A620433
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A620433
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A620433
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	104	104	110	N/A	N/A	A620433
D8-ACENAPHTHYLENE (sur.)	%	103	102	106	N/A	N/A	A620433
D8-NAPHTHALENE (sur.)	%	95	96	100	N/A	N/A	A620433
TERPHENYL-D14 (sur.)	%	97	72	91	N/A	N/A	A620433
RDL = Reportable Detection Limit							
N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C244102
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CXN

SEMIVOLATILE ORGANICS BY GC-MS (GROUND WATER)

Bureau Veritas ID		AVQ919			
Sampling Date		2022/06/22 13:20			
COC Number		666638-01-01			
	UNITS	WG-11222680-220622 -CXW-05	RDL	MDL	QC Batch
Polycyclic Aromatics					
Naphthalene	ug/L	<0.10	0.10	0.050	A620433
Acenaphthene	ug/L	<0.050	0.050	0.050	A620433
Fluorene	ug/L	<0.050	0.050	0.050	A620433
Phenanthrene	ug/L	<0.050	0.050	0.050	A620433
Anthracene	ug/L	<0.010	0.010	0.010	A620433
Acridine	ug/L	<0.050	0.050	0.050	A620433
Fluoranthene	ug/L	<0.020	0.020	0.020	A620433
Pyrene	ug/L	<0.020	0.020	0.020	A620433
Benzo(a)anthracene	ug/L	<0.010	0.010	0.010	A620433
Benzo(a)pyrene	ug/L	<0.0050	0.0050	0.0050	A620433
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	108	N/A	N/A	A620433
D8-ACENAPHTHYLENE (sur.)	%	106	N/A	N/A	A620433
D8-NAPHTHALENE (sur.)	%	102	N/A	N/A	A620433
TERPHENYL-D14 (sur.)	%	92	N/A	N/A	A620433
RDL = Reportable Detection Limit N/A = Not Applicable					



BUREAU
VERITAS

Bureau Veritas Job #: C244102

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXN

TOTAL PETROLEUM HYDROCARBONS (GROUND WATER)

Bureau Veritas ID		AVQ916	AVQ917	AVQ918	AVQ919			
Sampling Date		2022/06/22 11:40	2022/06/22 12:30	2022/06/22 13:40	2022/06/22 13:20			
COC Number		666638-01-01	666638-01-01	666638-01-01	666638-01-01			
	UNITS	WG-11222680-220622 -CXW-02	WG-11222680-220622 -CXW-03	WG-11222680-220622 -CXW-04	WG-11222680-220622 -CXW-05	RDL	MDL	QC Batch

Calculated Parameters

LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A619927
HEPH (C19-C32 less PAH)	mg/L	0.23	<0.20	<0.20	<0.20	0.20	0.20	A619927

Ext. Pet. Hydrocarbon

EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A620435
EPH (C19-C32)	mg/L	0.23	<0.20	<0.20	<0.20	0.20	0.20	A620435

Surrogate Recovery (%)

O-TERPHENYL (sur.)	%	102	100	99	99	N/A	N/A	A620435

RDL = Reportable Detection Limit

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C244102
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CXN

MISCELLANEOUS (GROUND WATER)

Bureau Veritas ID		AVQ916	AVQ917	AVQ918			
Sampling Date		2022/06/22 11:40	2022/06/22 12:30	2022/06/22 13:40			
COC Number		666638-01-01	666638-01-01	666638-01-01			
	UNITS	WG-11222680-220622 -CXW-02	WG-11222680-220622 -CXW-03	WG-11222680-220622 -CXW-04	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	0.032	<0.0050	<0.0050	0.0050	0.0050	A620204
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	0.034	<0.0050	<0.0050	0.0050	0.0050	A620204
RDL = Reportable Detection Limit							

Bureau Veritas ID		AVQ919			
Sampling Date		2022/06/22 13:20			
COC Number		666638-01-01			
	UNITS	WG-11222680-220622 -CXW-05	RDL	MDL	QC Batch
Calculated Parameters					
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	0.0050	0.0050	A620204
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	0.0050	0.0050	A620204
RDL = Reportable Detection Limit					

BUREAU
VERITAS

Bureau Veritas Job #: C244102

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXN

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		AVQ916	AVQ917	AVQ918			
Sampling Date		2022/06/22 11:40	2022/06/22 12:30	2022/06/22 13:40			
COC Number		666638-01-01	666638-01-01	666638-01-01			
	UNITS	WG-11222680-220622 -CXW-02	WG-11222680-220622 -CXW-03	WG-11222680-220622 -CXW-04	RDL	MDL	QC Batch

Calculated Parameters							
Dissolved Hardness (CaCO ₃)	mg/L	89.4	54.6	50.9	0.50	0.50	A619924
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	0.0019	A620465
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	7.7	3.4	<3.0	3.0	0.030	A619773
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	0.0020	A619773
Dissolved Arsenic (As)	ug/L	0.20	0.70	0.11	0.10	0.010	A619773
Dissolved Barium (Ba)	ug/L	6.2	3.0	6.0	1.0	0.0020	A619773
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	0.0030	A619773
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	0.0010	A619773
Dissolved Boron (B)	ug/L	<50	<50	<50	50	50	A619773
Dissolved Cadmium (Cd)	ug/L	0.013	<0.010	0.016	0.010	0.0020	A619773
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	0.020	A619773
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	0.20	A619773
Dissolved Copper (Cu)	ug/L	0.43	<0.20	0.28	0.20	0.010	A619773
Dissolved Iron (Fe)	ug/L	15.5	<5.0	13.0	5.0	0.040	A619773
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	0.0010	A619773
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	2.0	A619773
Dissolved Manganese (Mn)	ug/L	1.0	<1.0	2.6	1.0	0.030	A619773
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	0.0020	A619773
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	0.010	A619773
Dissolved Phosphorus (P)	ug/L	15	14	15	10	1.0	A619773
Dissolved Selenium (Se)	ug/L	0.24	0.21	0.74	0.10	0.0060	A619773
Dissolved Silicon (Si)	ug/L	9810	6420	7190	100	0.30	A619773
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	0.0020	A619773
Dissolved Strontium (Sr)	ug/L	44.9	25.1	80.9	1.0	0.0020	A619773
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A619773
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	0.0050	A619773
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	0.30	A619773
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	0.0010	A619773
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	0.020	A619773

RDL = Reportable Detection Limit



CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		AVQ916	AVQ917	AVQ918			
Sampling Date		2022/06/22 11:40	2022/06/22 12:30	2022/06/22 13:40			
COC Number		666638-01-01	666638-01-01	666638-01-01			
	UNITS	WG-11222680-220622 -CXW-02	WG-11222680-220622 -CXW-03	WG-11222680-220622 -CXW-04	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	0.050	A619773
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	0.0080	A619773
Dissolved Calcium (Ca)	mg/L	28.2	17.5	15.0	0.050	0.0010	A619925
Dissolved Magnesium (Mg)	mg/L	4.58	2.66	3.28	0.050	0.00050	A619925
Dissolved Potassium (K)	mg/L	0.440	0.329	0.317	0.050	0.0020	A619925
Dissolved Sodium (Na)	mg/L	6.06	4.94	30.6	0.050	0.0010	A619925
Dissolved Sulphur (S)	mg/L	4.5	<3.0	7.2	3.0	1.0	A619925
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C244102
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CXN

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		AVQ919			
Sampling Date		2022/06/22 13:20			
COC Number		666638-01-01			
	UNITS	WG-11222680-220622 -CXW-05	RDL	MDL	QC Batch

Calculated Parameters					
Dissolved Hardness (CaCO ₃)	mg/L	47.7	0.50	0.50	A619924
Elements					
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	A620465
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	<3.0	3.0	0.030	A619773
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	0.0020	A619773
Dissolved Arsenic (As)	ug/L	<0.10	0.10	0.010	A619773
Dissolved Barium (Ba)	ug/L	2.1	1.0	0.0020	A619773
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	0.0030	A619773
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	A619773
Dissolved Boron (B)	ug/L	<50	50	50	A619773
Dissolved Cadmium (Cd)	ug/L	0.019	0.010	0.0020	A619773
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	0.020	A619773
Dissolved Cobalt (Co)	ug/L	<0.20	0.20	0.20	A619773
Dissolved Copper (Cu)	ug/L	0.23	0.20	0.010	A619773
Dissolved Iron (Fe)	ug/L	9.3	5.0	0.040	A619773
Dissolved Lead (Pb)	ug/L	<0.20	0.20	0.0010	A619773
Dissolved Lithium (Li)	ug/L	<2.0	2.0	2.0	A619773
Dissolved Manganese (Mn)	ug/L	1.4	1.0	0.030	A619773
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	A619773
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	0.010	A619773
Dissolved Phosphorus (P)	ug/L	12	10	1.0	A619773
Dissolved Selenium (Se)	ug/L	0.71	0.10	0.0060	A619773
Dissolved Silicon (Si)	ug/L	7170	100	0.30	A619773
Dissolved Silver (Ag)	ug/L	<0.020	0.020	0.0020	A619773
Dissolved Strontium (Sr)	ug/L	83.4	1.0	0.0020	A619773
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	0.010	A619773
Dissolved Tin (Sn)	ug/L	<5.0	5.0	0.0050	A619773
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	0.30	A619773
Dissolved Uranium (U)	ug/L	<0.10	0.10	0.0010	A619773
Dissolved Vanadium (V)	ug/L	<5.0	5.0	0.020	A619773
RDL = Reportable Detection Limit					



**BUREAU
VERITAS**

Bureau Veritas Job #: C244102

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXN

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		AVQ919			
Sampling Date		2022/06/22 13:20			
COC Number		666638-01-01			
	UNITS	WG-11222680-220622 -CXW-05	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	0.050	A619773
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	0.0080	A619773
Dissolved Calcium (Ca)	mg/L	14.0	0.050	0.0010	A619925
Dissolved Magnesium (Mg)	mg/L	3.12	0.050	0.00050	A619925
Dissolved Potassium (K)	mg/L	0.306	0.050	0.0020	A619925
Dissolved Sodium (Na)	mg/L	29.4	0.050	0.0010	A619925
Dissolved Sulphur (S)	mg/L	6.2	3.0	1.0	A619925
RDL = Reportable Detection Limit					



BUREAU
VERITAS

Bureau Veritas Job #: C244102

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXN

GENERAL COMMENTS

Version 2: Report reissued to include results for dissolved phosphorus on samples requesting dissolved metals on 2022/07/06

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C244102

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXN

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A620433	D10-ANTHRACENE (sur.)	2022/06/24			106	50 - 140	111	%		
A620433	D8-ACENAPHTHYLENE (sur.)	2022/06/24			106	50 - 140	110	%		
A620433	D8-NAPHTHALENE (sur.)	2022/06/24			101	50 - 140	103	%		
A620433	TERPHENYL-D14 (sur.)	2022/06/24			109	50 - 140	100	%		
A620435	O-TERPHENYL (sur.)	2022/06/24			102	60 - 140	99	%		
A619773	Dissolved Aluminum (Al)	2022/06/24	101	80 - 120	104	80 - 120	<3.0	ug/L	NC (1)	20
A619773	Dissolved Antimony (Sb)	2022/06/24	100	80 - 120	103	80 - 120	<0.50	ug/L	NC (1)	20
A619773	Dissolved Arsenic (As)	2022/06/24	102	80 - 120	103	80 - 120	<0.10	ug/L	16 (1)	20
A619773	Dissolved Barium (Ba)	2022/06/24	97	80 - 120	99	80 - 120	<1.0	ug/L	0.43 (1)	20
A619773	Dissolved Beryllium (Be)	2022/06/24	100	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
A619773	Dissolved Bismuth (Bi)	2022/06/24	97	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A619773	Dissolved Boron (B)	2022/06/24	99	80 - 120	101	80 - 120	<50	ug/L	NC (1)	20
A619773	Dissolved Cadmium (Cd)	2022/06/24	100	80 - 120	102	80 - 120	<0.010	ug/L	13 (1)	20
A619773	Dissolved Chromium (Cr)	2022/06/24	98	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
A619773	Dissolved Cobalt (Co)	2022/06/24	96	80 - 120	99	80 - 120	<0.20	ug/L	NC (1)	20
A619773	Dissolved Copper (Cu)	2022/06/24	96	80 - 120	100	80 - 120	<0.20	ug/L	4.1 (1)	20
A619773	Dissolved Iron (Fe)	2022/06/24	101	80 - 120	103	80 - 120	<5.0	ug/L	9.7 (1)	20
A619773	Dissolved Lead (Pb)	2022/06/24	102	80 - 120	103	80 - 120	<0.20	ug/L	NC (1)	20
A619773	Dissolved Lithium (Li)	2022/06/24	98	80 - 120	100	80 - 120	<2.0	ug/L	NC (1)	20
A619773	Dissolved Manganese (Mn)	2022/06/24	96	80 - 120	100	80 - 120	<1.0	ug/L	2.6 (1)	20
A619773	Dissolved Molybdenum (Mo)	2022/06/24	105	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
A619773	Dissolved Nickel (Ni)	2022/06/24	96	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A619773	Dissolved Phosphorus (P)	2022/06/24	102	80 - 120	104	80 - 120	<10	ug/L		
A619773	Dissolved Selenium (Se)	2022/06/24	105	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
A619773	Dissolved Silicon (Si)	2022/06/24	NC	80 - 120	112	80 - 120	<100	ug/L	1.4 (1)	20
A619773	Dissolved Silver (Ag)	2022/06/24	100	80 - 120	102	80 - 120	<0.020	ug/L	NC (1)	20
A619773	Dissolved Strontium (Sr)	2022/06/24	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.88 (1)	20
A619773	Dissolved Thallium (Tl)	2022/06/24	98	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
A619773	Dissolved Tin (Sn)	2022/06/24	100	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
A619773	Dissolved Titanium (Ti)	2022/06/24	100	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A619773	Dissolved Uranium (U)	2022/06/24	102	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20



BUREAU
VERITAS

Bureau Veritas Job #: C244102

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXN

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A619773	Dissolved Vanadium (V)	2022/06/24	100	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
A619773	Dissolved Zinc (Zn)	2022/06/24	103	80 - 120	109	80 - 120	<5.0	ug/L	1.5 (1)	20
A619773	Dissolved Zirconium (Zr)	2022/06/24	101	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
A620347	Total Ammonia (N)	2022/06/23	104 (2)	80 - 120	106	80 - 120	<0.015	mg/L	NC (3)	20
A620433	Acenaphthene	2022/06/24			99	50 - 140	<0.050	ug/L		
A620433	Acridine	2022/06/24			96	50 - 140	<0.050	ug/L		
A620433	Anthracene	2022/06/24			101	50 - 140	<0.010	ug/L		
A620433	Benzo(a)anthracene	2022/06/24			102	50 - 140	<0.010	ug/L		
A620433	Benzo(a)pyrene	2022/06/24			101	50 - 140	<0.0050	ug/L		
A620433	Fluoranthene	2022/06/24			107	50 - 140	<0.020	ug/L		
A620433	Fluorene	2022/06/24			101	50 - 140	<0.050	ug/L		
A620433	Naphthalene	2022/06/24			94	50 - 140	<0.10	ug/L		
A620433	Phenanthrene	2022/06/24			98	50 - 140	<0.050	ug/L		
A620433	Pyrene	2022/06/24			106	50 - 140	<0.020	ug/L		
A620435	EPH (C10-C19)	2022/06/24			92	70 - 130	<0.20	mg/L		
A620435	EPH (C19-C32)	2022/06/24			116	70 - 130	<0.20	mg/L		
A620465	Dissolved Mercury (Hg)	2022/06/24	94	80 - 120	101	80 - 120	<0.0019	ug/L	NC (1)	20
A620578	Orthophosphate (P)	2022/06/23	94	80 - 120	101	80 - 120	<0.0030	mg/L	0.011 (1)	20
A620723	Chloride (Cl)	2022/06/23	NC	80 - 120	105	80 - 120	<1.0	mg/L	9.3 (1)	20
A620723	Sulphate (SO4)	2022/06/23	NC	80 - 120	109	80 - 120	<1.0	mg/L	0.32 (1)	20
A620922	Alkalinity (PP as CaCO3)	2022/06/23					<1.0	mg/L	NC (5)	20
A620922	Alkalinity (Total as CaCO3)	2022/06/23	NC (4)	80 - 120	94	80 - 120	<1.0	mg/L	1.3 (5)	20
A620922	Bicarbonate (HCO3)	2022/06/23					<1.0	mg/L	1.3 (5)	20
A620922	Carbonate (CO3)	2022/06/23					<1.0	mg/L	NC (5)	20
A620922	Hydroxide (OH)	2022/06/23					<1.0	mg/L	NC (5)	20
A620923	Conductivity	2022/06/23			100	80 - 120	<2.0	uS/cm	0.98 (5)	10
A620954	Nitrate plus Nitrite (N)	2022/06/23	106	80 - 120	104	80 - 120	<0.020	mg/L	NC (1)	25
A620955	Nitrite (N)	2022/06/23	99	80 - 120	100	80 - 120	<0.0050	mg/L	NC (1)	20
A623567	Total Sulphide	2022/06/27	118 (6)	80 - 120	115	80 - 120	<0.0018	mg/L	NC (7)	20
A625496	Total Dissolved Solids	2022/06/29	102	80 - 120	99	80 - 120	<10	mg/L	1.6 (1)	20



BUREAU
VERITAS

Bureau Veritas Job #: C244102

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXN

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A625621	Total Sulphide	2022/06/28	NC	80 - 120	116	80 - 120	<0.0018	mg/L	NC (8)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [AVQ916-04]

(3) Duplicate Parent ID [AVQ916-04]

(4) Matrix Spike Parent ID [AVQ916-02]

(5) Duplicate Parent ID [AVQ916-02]

(6) Matrix Spike Parent ID [AVQ917-03]

(7) Duplicate Parent ID [AVQ919-03]

(8) Duplicate Parent ID [AVQ916-03]



BUREAU
VERITAS

Bureau Veritas Job #: C244102

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Sze Yeung Fock, B.Sc., Scientific Specialist



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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Bureau Veritas
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Page 1 of 1

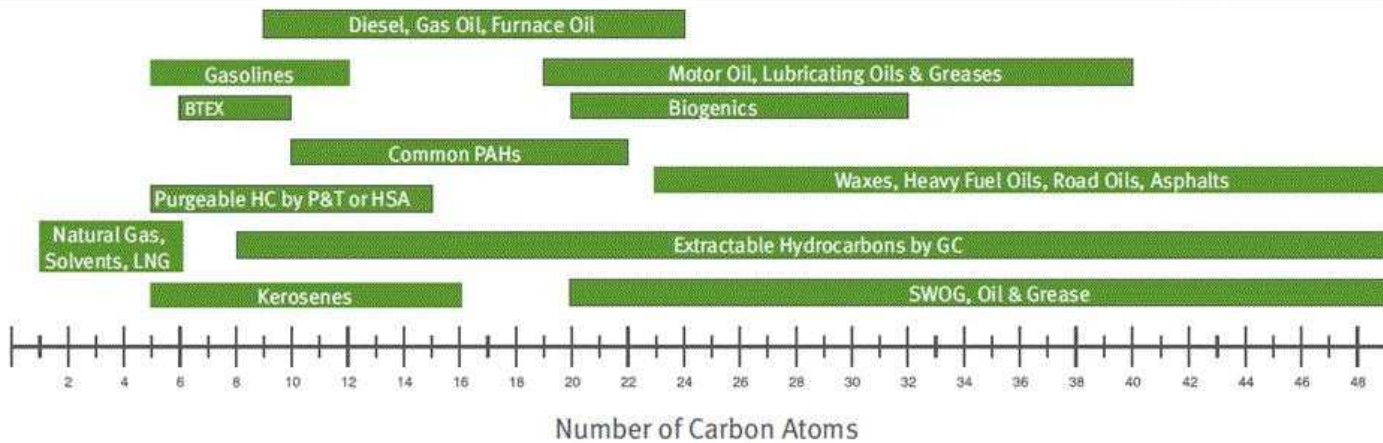
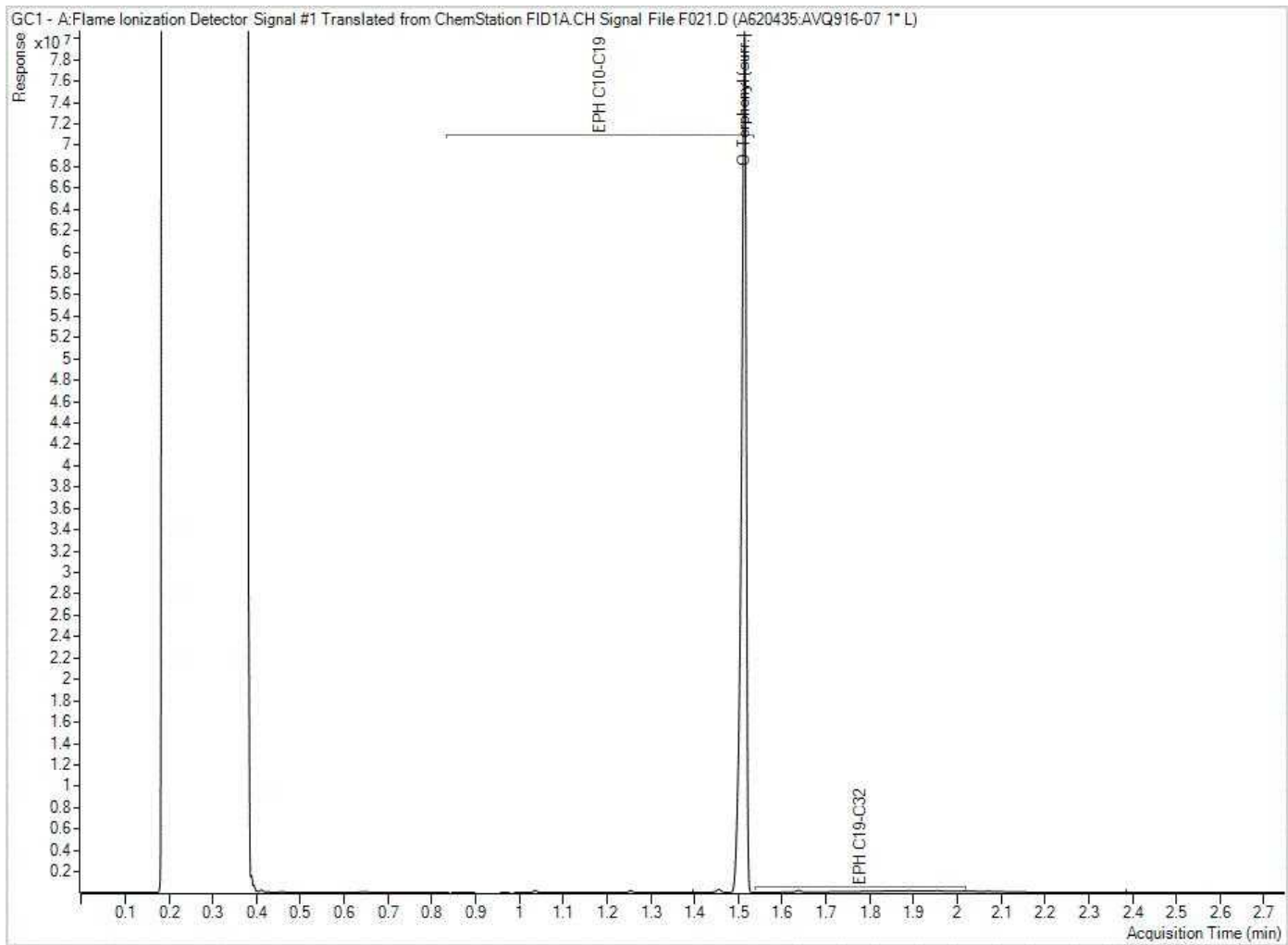
Chain Of Custody Record

INVOICE TO:		Report Information		Project Information		Laboratory Use Only											
Company Name	#163 GHD Limited	Company Name	Airesse MacPhee	Quotation #	C10010	Bureau Veritas Job #	Bottle Order #:										
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #	735-002640												
Address	455 PHILLIP STREET WATERLOO ON N2L 3X2	Address		Project #	11222680												
Phone	(519) 884-0510	Phone		Project Name	Upland EMP	Chain Of Custody Record	Project Manager										
Email	APInvoices-735@ghd.com	Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Site #	Groundwater		Thomas Pinchin										
				Sampled By	CXW												
Regulatory Criteria:		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)				Turnaround Time (TAT) Required:									
☒ CSR ☐ CCME ☐ BC Water Quality ☐ Other		All samples preserved & filtered as required 1 cooler SHORT HOLD TIMES						Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission): 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐ Rush Confirmation Number: _____ (call lab for #)									
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS																	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y/N)	Conductivity, Cl, SO4, NO2, NO3, N+N, PO4	Speciated Alkalinity or the phosphate	Sulphide + H2S Calc	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg. Hardness	Total Dissolved Solids (Filt. Residue)	LEPH/EPH with subtracted PAHs	Field pH	Field Temperature	# of Bottles	Comments
1	W6-11222680-220622-CXW-02	June 22, 22	11:40	GW	Y	X	X	X	X	X	X	X	X	7.38	14.69	7	
2	N6-11222680-220622-CXW-03	June 22, 22	12:30											7.85	12.99		
3	W6-11222680-220622-CXW-04	June 22, 22	13:40											6.81	10.28		
4	W6-11222680-220622-CXW-05	June 22, 22	13:20											6.79	9.46		
5																	
6																	
7																	
8																	
9																	
10																	
RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only		Time Sensitive		Temperature (°C) on Receipt	Custody Seal Intact on Cooler?		White Bureau Veritas Yellow Client	
Caray Wang		22/06/22	14:00	Taylor Whitehouse		22/06/22	8:40				☐		3, 2, 7	☐ Yes ☒ No			
* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS.																	
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.																	

Bureau Veritas Canada (2019) Inc.

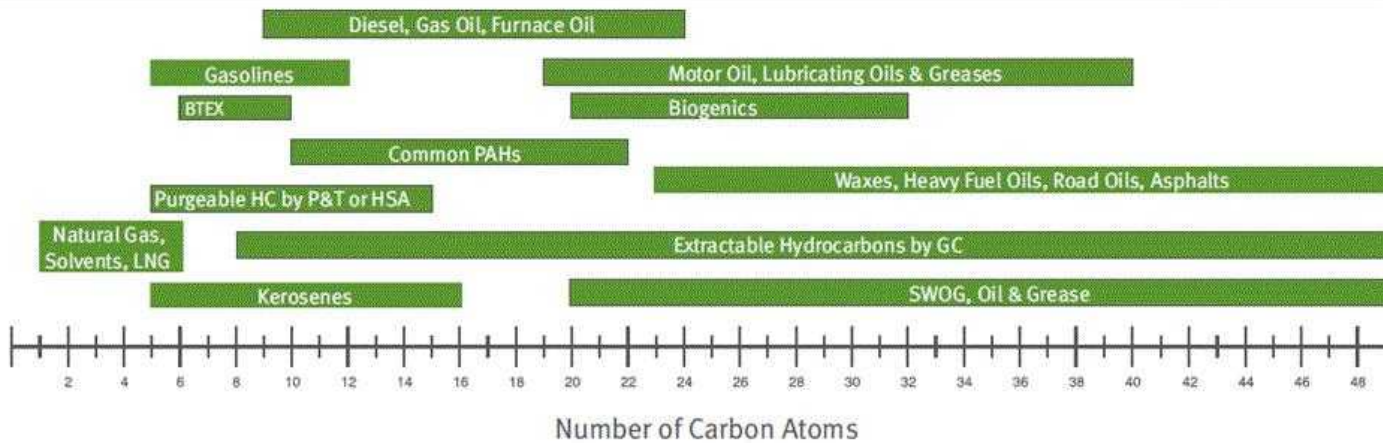
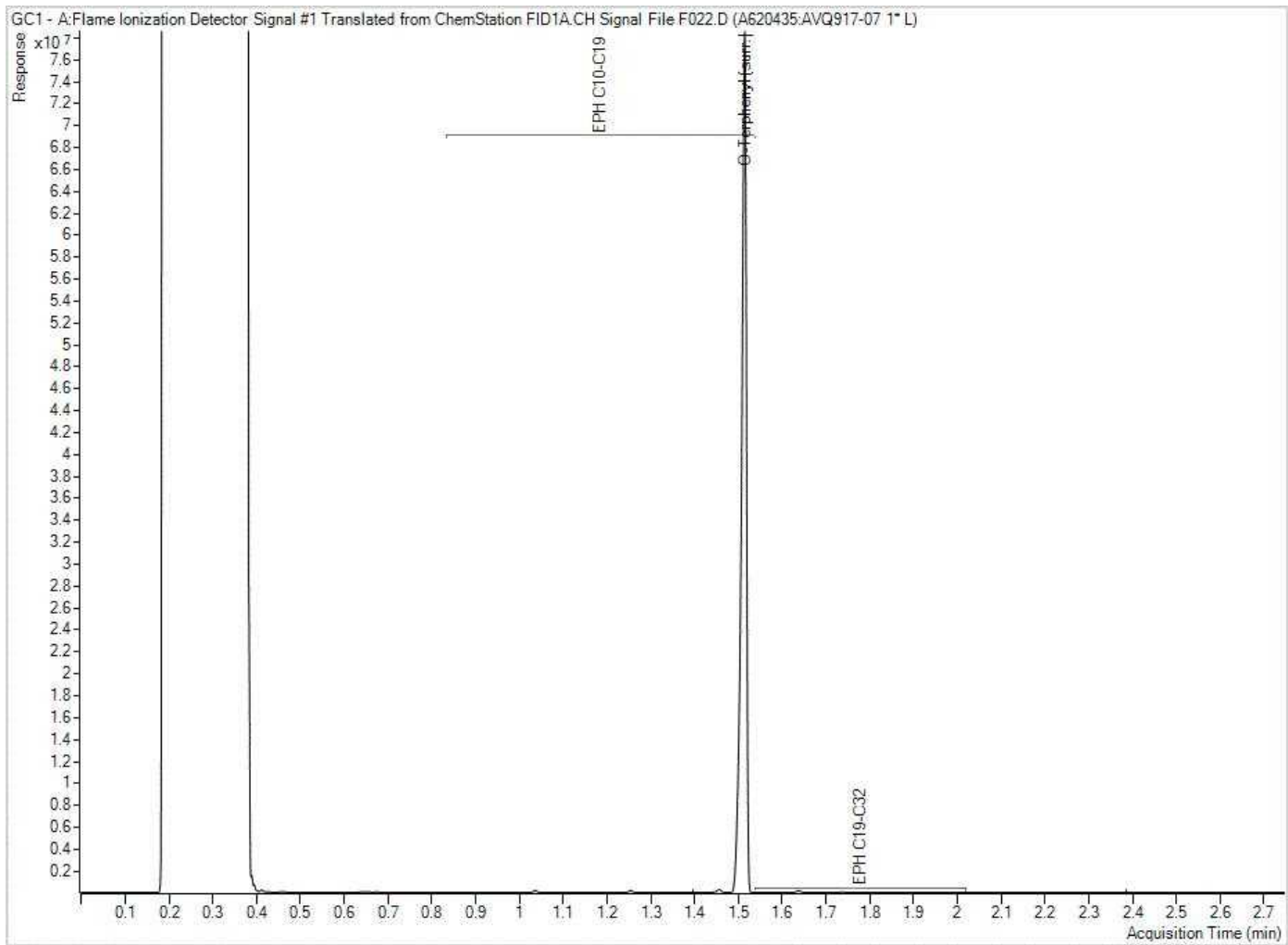
ice! yes

EPH in Water when PAH required Chromatogram



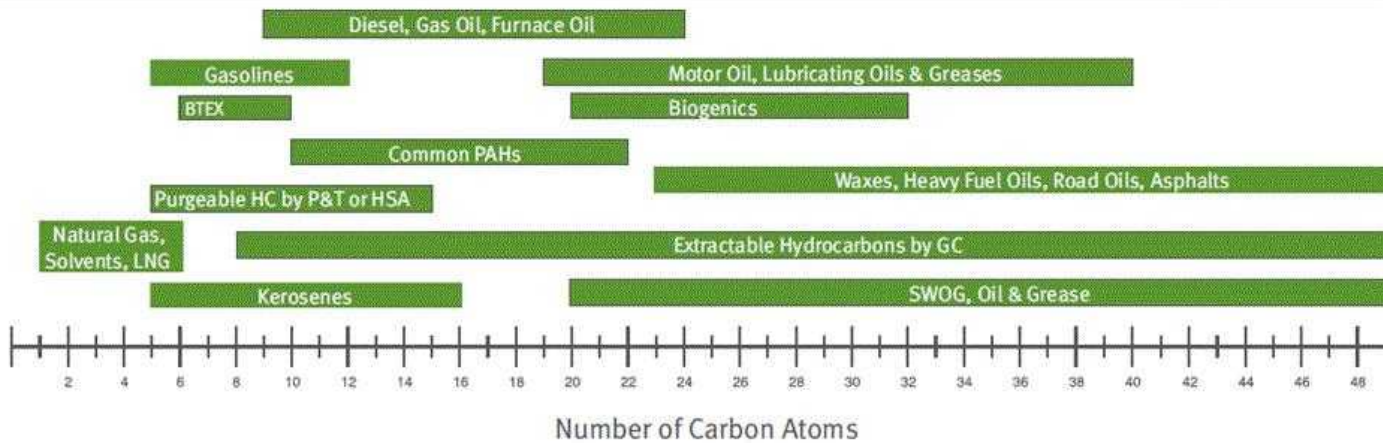
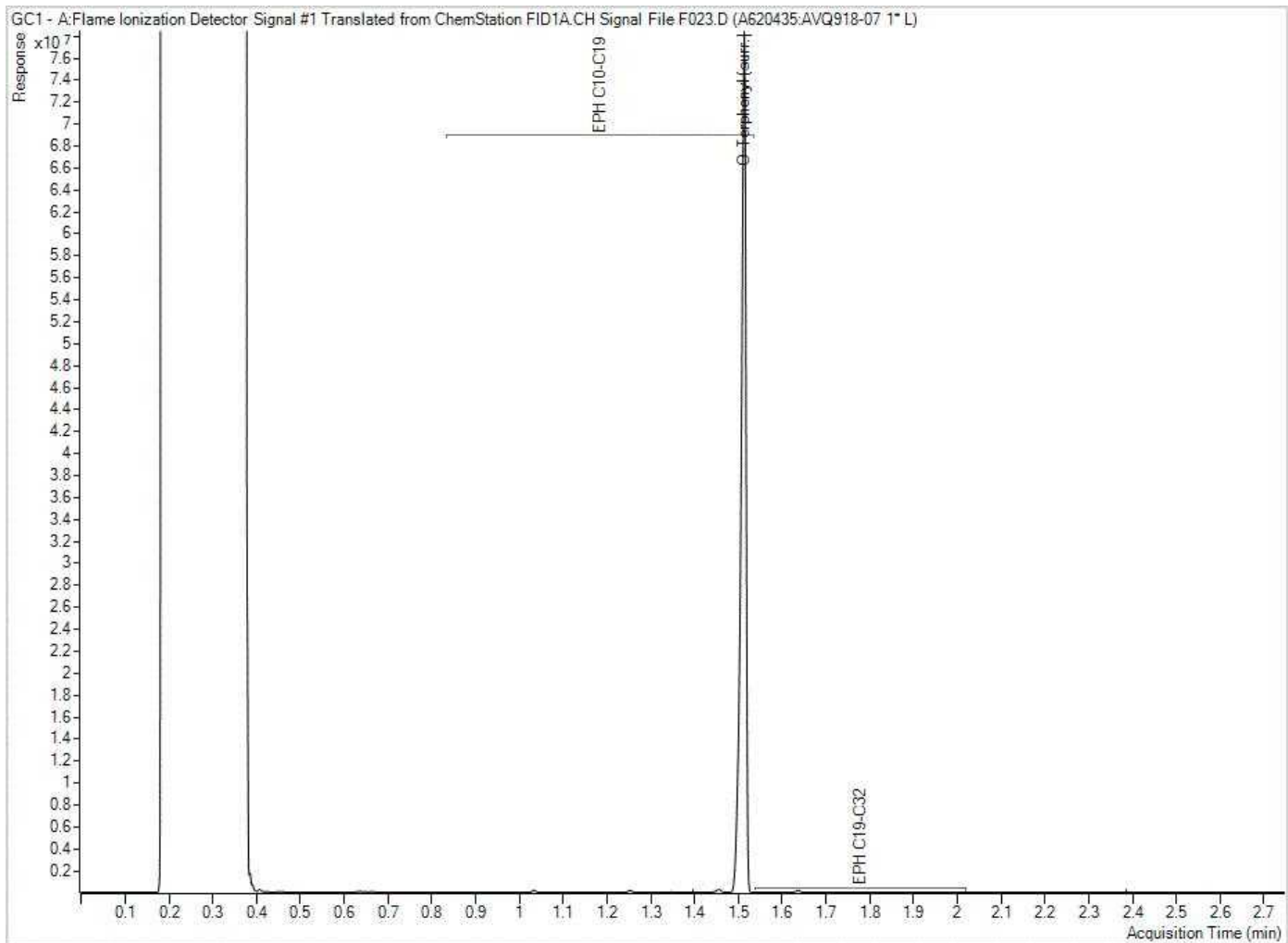
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



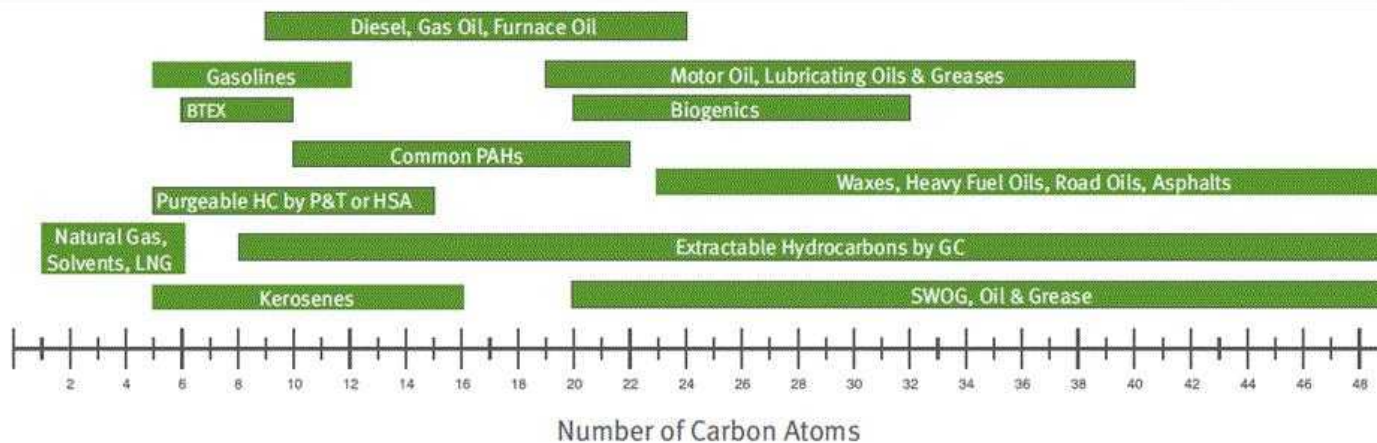
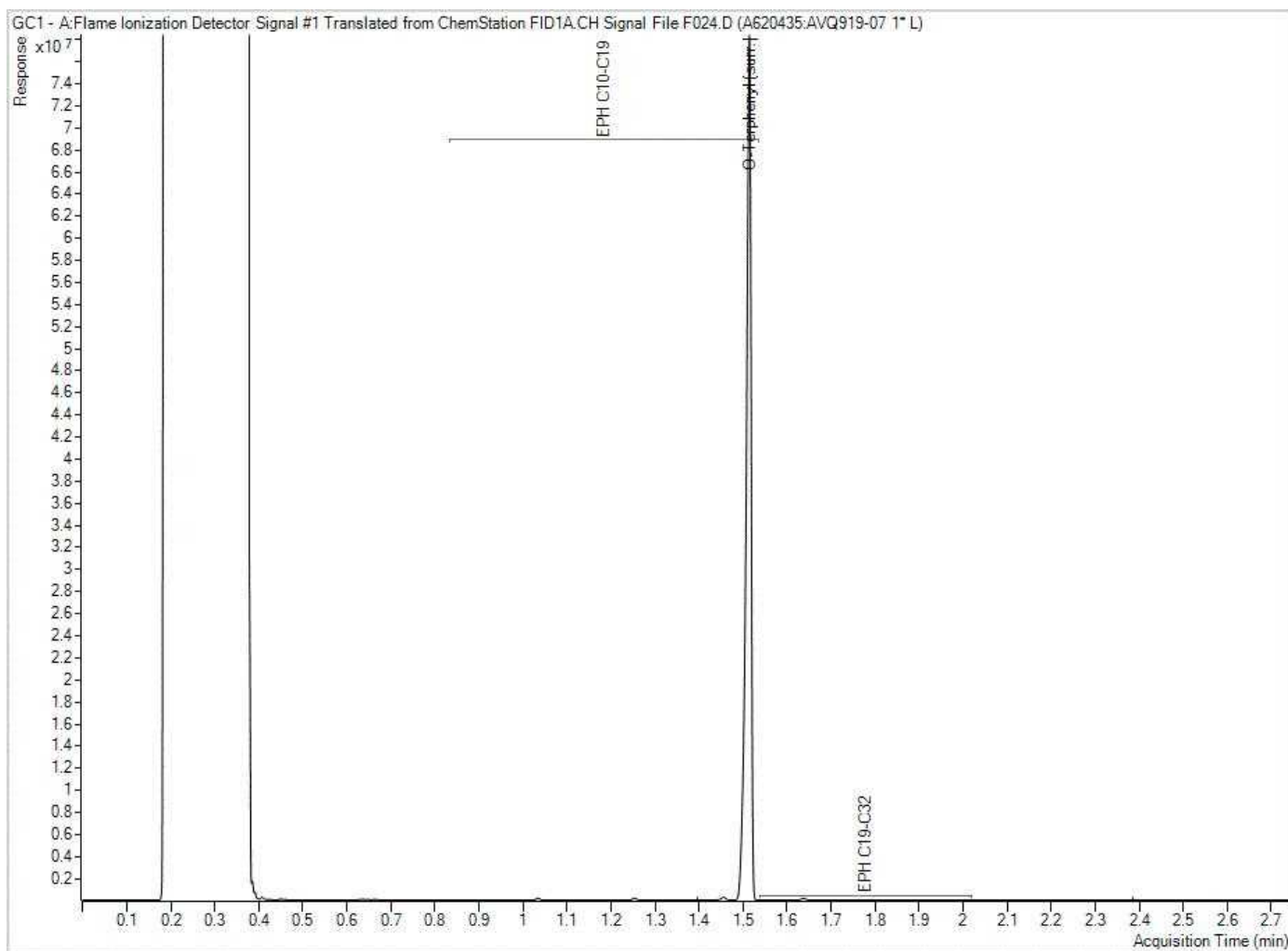
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640
Your Project #: 11222680
Site#: LEACHATE WATER
Site Location: UPLAND EMP
Your C.O.C. #: 666640-01-01

Report Date: 2022/07/04

Report #: R3194949

Version: 1 - Final

CERTIFICATE OF ANALYSIS**BUREAU VERITAS JOB #: C244592****Received: 2022/06/24, 11:13**

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	5	N/A	2022/06/25	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	5	2022/06/24	2022/06/29	BBY6SOP-00045	SM 23 5210 B m
Chloride/Sulphate by Auto Colourimetry	5	N/A	2022/06/27	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO ₄ -E m
COD by Colorimeter	5	N/A	2022/06/29	BBY6SOP-00024	SM 23 5220 D m
Conductivity @25C	5	N/A	2022/06/25	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H ₂ S) (1)	1	N/A	2022/06/27		Auto Calc
Sulphide (as H ₂ S) (1)	3	N/A	2022/06/28		Auto Calc
Sulphide (as H ₂ S) (1)	1	N/A	2022/06/30		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc (1)	1	N/A	2022/06/27		
Un-ionized Hydrogen Sulphide as S Calc (1)	3	N/A	2022/06/28		
Un-ionized Hydrogen Sulphide as S Calc (1)	1	N/A	2022/06/30		
Hardness (calculated as CaCO ₃)	5	N/A	2022/06/29	BBY WI-00033	Auto Calc
Mercury (Total) by CV	3	2022/06/27	2022/06/27	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	2	2022/06/28	2022/06/28	AB SOP-00084	BCMOE BCLM Oct2013 m
ICP-OES Dissolved Metals in Water (2)	3	N/A	2022/06/28	BBY7SOP-00018	EPA 6010d m
ICP-OES Dissolved Metals in Water (2)	2	N/A	2022/07/04	BBY7SOP-00018	EPA 6010d m
EPH in Water when PAH required	5	2022/06/27	2022/06/27	BBY8SOP-00029	BCMOE BCLM Sep2017 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	5	2022/06/24	2022/06/28	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	5	2022/06/25	2022/06/27	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	5	N/A	2022/06/27	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate + Nitrite (N)	5	N/A	2022/06/25	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrite (N) by CFA	5	N/A	2022/06/25	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	5	N/A	2022/06/27	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	4	2022/06/27	2022/06/27	BBY8SOP-00021	BCMOE BCLM Jul2017m
PAH in Water by GC/MS (SIM)	1	2022/06/27	2022/06/28	BBY8SOP-00021	BCMOE BCLM Jul2017m
Filter and HNO ₃ Preserve for Metals	5	N/A	2022/06/24	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (3)	5	N/A	2022/06/25	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	3	N/A	2022/06/27	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Sulphide (1)	1	N/A	2022/06/28	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Sulphide (1)	1	N/A	2022/06/30	AB SOP-00080	SM 23 4500 S ₂ -A D Fm

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640
Your Project #: 11222680
Site#: LEACHATE WATER
Site Location: UPLAND EMP
Your C.O.C. #: 666640-01-01

Report Date: 2022/07/04

Report #: R3194949

Version: 1 - Final

CERTIFICATE OF ANALYSIS**BUREAU VERITAS JOB #: C244592****Received: 2022/06/24, 11:13**

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Total Dissolved Solids (Filt. Residue)	1	2022/06/28	2022/06/30	BBY6SOP-00033	SM 23 2540 C m
Total Dissolved Solids (Filt. Residue)	4	2022/06/29	2022/06/30	BBY6SOP-00033	SM 23 2540 C m
EPH less PAH in Water by GC/FID (4)	4	N/A	2022/06/29	BBY WI-00033	Auto Calc
EPH less PAH in Water by GC/FID (4)	1	N/A	2022/06/30	BBY WI-00033	Auto Calc
Total Suspended Solids (NFR)	5	2022/06/29	2022/06/30	BBY6SOP-00034	SM 23 2540 D m
Field pH	5	N/A	2022/06/24		
Field Temperature	5	N/A	2022/06/24		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.

(3) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

(4) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)



Attention: Airesse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640
Your Project #: 11222680
Site#: LEACHATE WATER
Site Location: UPLAND EMP
Your C.O.C. #: 666640-01-01

Report Date: 2022/07/04
Report #: R3194949
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C244592

Received: 2022/06/24, 11:13

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Thomas Pinchin, Project Solutions Representative

Email: Thomas.Pinchin@bureauveritas.com

Phone# (604) 734 7276

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

BUREAU
VERITAS

Bureau Veritas Job #: C244592

Report Date: 2022/07/04

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT914	AVT914		AVT915			
Sampling Date		2022/06/23 10:00	2022/06/23 10:00		2022/06/23 10:05			
COC Number		666640-01-01	666640-01-01		666640-01-01			
	UNITS	WL-11222680-230622- CXW-01	WL-11222680-230622- CXW-01 Lab-Dup	QC Batch	WL-11222680-230622- CXW-02	RDL	MDL	QC Batch

ANIONS

Nitrite (N)	mg/L	0.0086	N/A	A622849	0.0094	0.0050	0.0050	A622849

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	450	N/A	A621389	430	0.50	0.50	A621389
Nitrate (N)	mg/L	0.728	N/A	A621392	0.722	0.020	N/A	A621392
Sulphide (as H2S)	mg/L	<0.0020	N/A	A621379	<0.0020	0.0020	N/A	A621379

Demand Parameters

Biochemical Oxygen Demand	mg/L	4.8	N/A	A621591	4.8	2.0	N/A	A621591
Chemical Oxygen Demand	mg/L	43	N/A	A625051	50	10	10	A625051

Field Parameters

Field pH	pH	6.68	N/A	ONSITE	6.68	N/A	N/A	ONSITE
Field Temperature	°C	8.81	N/A	ONSITE	8.81	N/A	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	530	N/A	A624622	530	2.0	N/A	A624622
Total Dissolved Solids	mg/L	270	N/A	A627390	310	10	N/A	A627390
Total Suspended Solids	mg/L	18	N/A	A626783	16	1.0	N/A	A626783

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	A624620	<1.0	1.0	N/A	A624620
Alkalinity (Total as CaCO3)	mg/L	180	N/A	A624620	180	1.0	N/A	A624620
Bicarbonate (HCO3)	mg/L	220	N/A	A624620	220	1.0	N/A	A624620
Carbonate (CO3)	mg/L	<1.0	N/A	A624620	<1.0	1.0	N/A	A624620
Hydroxide (OH)	mg/L	<1.0	N/A	A624620	<1.0	1.0	N/A	A624620
Total Sulphide	mg/L	<0.0018	<0.0018	A624895	<0.0018 (1)	0.0018	N/A	A624755
Chloride (Cl)	mg/L	25	N/A	A624809	26	1.0	N/A	A624809
Sulphate (SO4)	mg/L	51	N/A	A624809	52	1.0	N/A	A624809

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) A laboratory mistake resulted in adding sulfuric acid instead of NaOH and Zinc Acetate. This was recognized immediately and the correct chemicals were added. Spiking a sample impacted by this still resulted in recovery within acceptance limits. However, there is still a possibility that results could be biased low due to this mistake.



**BUREAU
VERITAS**

Bureau Veritas Job #: C244592

Report Date: 2022/07/04

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT914	AVT914		AVT915			
Sampling Date		2022/06/23 10:00	2022/06/23 10:00		2022/06/23 10:05			
COC Number		666640-01-01	666640-01-01		666640-01-01			
	UNITS	WL-11222680-230622- CXW-01	WL-11222680-230622- CXW-01 Lab-Dup	QC Batch	WL-11222680-230622- CXW-02	RDL	MDL	QC Batch

Nutrients								
Total Ammonia (N)	mg/L	0.65	N/A	A624284	0.79	0.015	0.0040	A624284
Orthophosphate (P)	mg/L	<0.0030	N/A	A623046	<0.0030	0.0030	0.0030	A623046
Nitrate plus Nitrite (N)	mg/L	0.736	N/A	A622848	0.732	0.020	0.020	A622848

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable



RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT916	AVT916			
Sampling Date		2022/06/23 11:05	2022/06/23 11:05			
COC Number		666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-03	WL-11222680-230622- CXW-03 Lab-Dup	RDL	MDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	0.0296	N/A	0.0050	0.0050	A622849
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	628	N/A	0.50	0.50	A621389
Nitrate (N)	mg/L	0.647	N/A	0.020	N/A	A621392
Sulphide (as H2S)	mg/L	0.14	N/A	0.0020	N/A	A621379
Demand Parameters						
Biochemical Oxygen Demand	mg/L	19	N/A	3.0	N/A	A621591
Chemical Oxygen Demand	mg/L	175	N/A	10	10	A625051
Field Parameters						
Field pH	pH	6.41	N/A	N/A	N/A	ONSITE
Field Temperature	°C	11.95	N/A	N/A	N/A	ONSITE
Misc. Inorganics						
Conductivity	uS/cm	1500	N/A	2.0	N/A	A624630
Total Dissolved Solids	mg/L	870	900	10	N/A	A627290
Total Suspended Solids	mg/L	63	N/A	1.0	N/A	A626783
Anions						
Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	N/A	A624632
Alkalinity (Total as CaCO3)	mg/L	590	N/A	1.0	N/A	A624632
Bicarbonate (HCO3)	mg/L	720	N/A	1.0	N/A	A624632
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	N/A	A624632
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	N/A	A624632
Total Sulphide	mg/L	0.14 (1)	N/A	0.0018	N/A	A624257
Chloride (Cl)	mg/L	120	N/A	1.0	N/A	A624809
Sulphate (SO4)	mg/L	4.6	N/A	1.0	N/A	A624809
Nutrients						
Total Ammonia (N)	mg/L	12	N/A	0.15	0.040	A624284
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.						



RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT916	AVT916			
Sampling Date		2022/06/23 11:05	2022/06/23 11:05			
COC Number		666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-03	WL-11222680-230622- CXW-03 Lab-Dup	RDL	MDL	QC Batch
Orthophosphate (P)	mg/L	0.016 (1)	0.016	0.0030	0.0030	A623046
Nitrate plus Nitrite (N)	mg/L	0.677	N/A	0.020	0.020	A622848
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) Matrix spike exceeds acceptance limits due to suspected matrix interference.						

BUREAU
VERITAS

Bureau Veritas Job #: C244592

Report Date: 2022/07/04

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT917	AVT917			
Sampling Date		2022/06/23 11:45	2022/06/23 11:45			
COC Number		666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-04	WL-11222680-230622- CXW-04 Lab-Dup	RDL	MDL	QC Batch

ANIONS						
Nitrite (N)	mg/L	<0.050 (1)	N/A	0.050	0.050	A622849
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	1820	N/A	0.50	0.50	A621389
Nitrate (N)	mg/L	<0.20	N/A	0.20	N/A	A621392
Sulphide (as H2S)	mg/L	22	N/A	0.19	N/A	A621379
Demand Parameters						
Biochemical Oxygen Demand	mg/L	130	N/A	15	N/A	A621591
Chemical Oxygen Demand	mg/L	611	N/A	10	10	A625051
Field Parameters						
Field pH	pH	6.85	N/A	N/A	N/A	ONSITE
Field Temperature	°C	16.10	N/A	N/A	N/A	ONSITE
Misc. Inorganics						
Conductivity	uS/cm	4000	N/A	2.0	N/A	A624630
Total Dissolved Solids	mg/L	3900 (2)	3900	13	N/A	A627390
Total Suspended Solids	mg/L	16	N/A	1.0	N/A	A626783
Anions						
Alkalinity (PP as CaCO3)	mg/L	<5.0	N/A	5.0	N/A	A624632
Alkalinity (Total as CaCO3)	mg/L	1500	N/A	5.0	N/A	A624632
Bicarbonate (HCO3)	mg/L	1900	N/A	5.0	N/A	A624632
Carbonate (CO3)	mg/L	<5.0	N/A	5.0	N/A	A624632
Hydroxide (OH)	mg/L	<5.0	N/A	5.0	N/A	A624632
Total Sulphide	mg/L	21 (3)	N/A	0.18	N/A	A624755

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) RDL raised due to sample matrix interference.

(2) RDL raised due to high concentration of solids in the sample.

(3) Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.

A laboratory mistake resulted in adding sulfuric acid instead of NaOH and Zinc Acetate. This was recognized immediately and the correct chemicals were added. Spiking a sample impacted by this still resulted in recovery within acceptance limits. However, there is still a possibility that results could be biased low due to this mistake.



RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT917	AVT917			
Sampling Date		2022/06/23 11:45	2022/06/23 11:45			
COC Number		666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-04	WL-11222680-230622- CXW-04 Lab-Dup	RDL	MDL	QC Batch
Chloride (Cl)	mg/L	230 (1)	N/A	10	N/A	A624809
Sulphate (SO4)	mg/L	800 (1)	N/A	10	N/A	A624809
Nutrients						
Total Ammonia (N)	mg/L	33	N/A	0.38	0.10	A624284
Orthophosphate (P)	mg/L	0.80	N/A	0.030	0.030	A623046
Nitrate plus Nitrite (N)	mg/L	<0.20 (1)	N/A	0.20	0.20	A622848
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) RDL raised due to sample matrix interference.						



BUREAU
VERITAS

Bureau Veritas Job #: C244592

Report Date: 2022/07/04

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT918			
Sampling Date		2022/06/23 17:20			
COC Number		666640-01-01			
	UNITS	WL-11222680-230622- CXW-05	RDL	MDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	0.0057	0.0050	0.0050	A622849
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	85.3	0.50	0.50	A621389
Nitrate (N)	mg/L	<0.020	0.020	N/A	A621392
Sulphide (as H2S)	mg/L	0.086	0.010	N/A	A621379
Demand Parameters					
Biochemical Oxygen Demand	mg/L	13	2.0	N/A	A621591
Chemical Oxygen Demand	mg/L	89	10	10	A625051
Field Parameters					
Field pH	pH	7.76	N/A	N/A	ONSITE
Field Temperature	°C	19.31	N/A	N/A	ONSITE
Misc. Inorganics					
Conductivity	uS/cm	3800	2.0	N/A	A624630
Total Dissolved Solids	mg/L	3800 (1)	13	N/A	A627390
Total Suspended Solids	mg/L	260	1.0	N/A	A626783
Anions					
Alkalinity (PP as CaCO3)	mg/L	46	1.0	N/A	A624632
Alkalinity (Total as CaCO3)	mg/L	1200	1.0	N/A	A624632
Bicarbonate (HCO3)	mg/L	1300	1.0	N/A	A624632
Carbonate (CO3)	mg/L	55	1.0	N/A	A624632
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	A624632
Total Sulphide	mg/L	0.081 (2)	0.0090	N/A	A628410
Chloride (Cl)	mg/L	37	1.0	N/A	A624809
Sulphate (SO4)	mg/L	840	10	N/A	A624809
RDL = Reportable Detection Limit					
N/A = Not Applicable					
(1) RDL raised due to high concentration of solids in the sample.					
(2) Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.					
Detection limit raised based on sample volume used and sample matrix					



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Sampler Initials: CNN

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT918			
Sampling Date		2022/06/23 17:20			
COC Number		666640-01-01			
	UNITS	WL-11222680-230622- CXW-05	RDL	MDL	QC Batch
Nutrients					
Total Ammonia (N)	mg/L	0.38	0.015	0.0040	A624284
Orthophosphate (P)	mg/L	0.21	0.0030	0.0030	A623046
Nitrate plus Nitrite (N)	mg/L	0.021	0.020	0.020	A622848
RDL = Reportable Detection Limit					



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Sampler Initials: CNN

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		AVT914	AVT915			AVT916			
Sampling Date		2022/06/23 10:00	2022/06/23 10:05			2022/06/23 11:05			
COC Number		666640-01-01	666640-01-01			666640-01-01			
	UNITS	WL-11222680-230622- CXW-01	WL-11222680-230622- CXW-02	RDL	MDL	WL-11222680-230622- CXW-03	RDL	MDL	QC Batch

Polycyclic Aromatics

Naphthalene	ug/L	<0.10	<0.10	0.10	0.050	1400	5.0	2.5	A623961
Acenaphthene	ug/L	<0.050	<0.050	0.050	0.050	140	2.5	2.5	A623961
Fluorene	ug/L	<0.050	<0.050	0.050	0.050	71	2.5	2.5	A623961
Phenanthrene	ug/L	<0.050	<0.050	0.050	0.050	83	2.5	2.5	A623961
Anthracene	ug/L	0.024	0.025	0.010	0.010	8.2	0.010	0.010	A623961
Acridine	ug/L	<0.050	<0.050	0.050	0.050	2.9	0.050	0.050	A623961
Fluoranthene	ug/L	<0.020	<0.020	0.020	0.020	10	0.020	0.020	A623961
Pyrene	ug/L	<0.020	<0.020	0.020	0.020	6.4	0.020	0.020	A623961
Benzo(a)anthracene	ug/L	<0.010	<0.010	0.010	0.010	0.51	0.010	0.010	A623961
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	0.0050	0.0050	0.18	0.0050	0.0050	A623961

Surrogate Recovery (%)

D10-ANTHRACENE (sur.)	%	117	111	N/A	N/A	88	N/A	N/A	A623961
D8-ACENAPHTHYLENE (sur.)	%	116	110	N/A	N/A	112	N/A	N/A	A623961
D8-NAPHTHALENE (sur.)	%	113	106	N/A	N/A	92	N/A	N/A	A623961
TERPHENYL-D14 (sur.)	%	104	101	N/A	N/A	82	N/A	N/A	A623961

RDL = Reportable Detection Limit

N/A = Not Applicable



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VERITAS

Bureau Veritas Job #: C244592
Report Date: 2022/07/04

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CNN

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		AVT917	AVT918			
Sampling Date		2022/06/23 11:45	2022/06/23 17:20			
COC Number		666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-04	WL-11222680-230622- CXW-05	RDL	MDL	QC Batch
Polycyclic Aromatics						
Naphthalene	ug/L	6.5	3.5	0.10	0.050	A623961
Acenaphthene	ug/L	0.79	1.9	0.050	0.050	A623961
Fluorene	ug/L	0.42	1.6	0.050	0.050	A623961
Phenanthrene	ug/L	0.42	3.1	0.050	0.050	A623961
Anthracene	ug/L	0.056 (1)	0.22	0.010	0.010	A623961
Acridine	ug/L	0.21	<0.050	0.050	0.050	A623961
Fluoranthene	ug/L	0.28	0.47	0.020	0.020	A623961
Pyrene	ug/L	0.24	0.32	0.020	0.020	A623961
Benzo(a)anthracene	ug/L	0.046	0.027	0.010	0.010	A623961
Benzo(a)pyrene	ug/L	0.013	0.012	0.0050	0.0050	A623961
Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	112	109	N/A	N/A	A623961
D8-ACENAPHTHYLENE (sur.)	%	115	111	N/A	N/A	A623961
D8-NAPHTHALENE (sur.)	%	115	107	N/A	N/A	A623961
TERPHENYL-D14 (sur.)	%	95	94	N/A	N/A	A623961
RDL = Reportable Detection Limit						
N/A = Not Applicable						
(1) Tentatively identified result and may be potentially biased high due to matrix interference.						



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Your P.O. #: 735-002640

Sampler Initials: CNN

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		AVT914	AVT915		AVT916			
Sampling Date		2022/06/23 10:00	2022/06/23 10:05		2022/06/23 11:05			
COC Number		666640-01-01	666640-01-01		666640-01-01			
	UNITS	WL-11222680-230622- CXW-01	WL-11222680-230622- CXW-02	QC Batch	WL-11222680-230622- CXW-03	RDL	MDL	QC Batch

Dissolved Metals by ICP								
Dissolved Calcium (Ca)	mg/L	138	132	A631991	185	0.050	0.050	A624166
Dissolved Magnesium (Mg)	mg/L	25.3	24.2	A631991	40.0	0.050	0.050	A624166

RDL = Reportable Detection Limit

Bureau Veritas ID		AVT917			AVT918			
Sampling Date		2022/06/23 11:45			2022/06/23 17:20			
COC Number		666640-01-01			666640-01-01			
	UNITS	WL-11222680-230622- CXW-04	RDL	MDL	WL-11222680-230622- CXW-05	RDL	MDL	QC Batch

Dissolved Metals by ICP								
Dissolved Calcium (Ca)	mg/L	643	0.50	0.50	21.5	0.050	0.050	A624166
Dissolved Magnesium (Mg)	mg/L	52.6	0.050	0.050	7.70	0.050	0.050	A624166

RDL = Reportable Detection Limit



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GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

TOTAL PETROLEUM HYDROCARBONS (WATER)

Bureau Veritas ID		AVT914	AVT915	AVT916	AVT917			
Sampling Date		2022/06/23 10:00	2022/06/23 10:05	2022/06/23 11:05	2022/06/23 11:45			
COC Number		666640-01-01	666640-01-01	666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-01	WL-11222680-230622- CXW-02	WL-11222680-230622- CXW-03	WL-11222680-230622- CXW-04	RDL	MDL	QC Batch

Calculated Parameters								
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	2.7	0.51	0.20	0.20	A621401
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	0.34	<0.20	0.20	0.20	A621401
Ext. Pet. Hydrocarbon								
EPH (C10-C19)	mg/L	<0.20	<0.20	4.5	0.52	0.20	0.20	A623968
EPH (C19-C32)	mg/L	<0.20	<0.20	0.35	<0.20	0.20	0.20	A623968
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	117	113	109	100	N/A	N/A	A623968
RDL = Reportable Detection Limit								
N/A = Not Applicable								

Bureau Veritas ID		AVT918			
Sampling Date		2022/06/23 17:20			
COC Number		666640-01-01			
	UNITS	WL-11222680-230622- CXW-05	RDL	MDL	QC Batch
Calculated Parameters					
LEPH (C10-C19 less PAH)	mg/L	<0.20	0.20	0.20	A621401
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	0.20	A621401
Ext. Pet. Hydrocarbon					
EPH (C10-C19)	mg/L	<0.20	0.20	0.20	A623968
EPH (C19-C32)	mg/L	<0.20	0.20	0.20	A623968
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	106	N/A	N/A	A623968
RDL = Reportable Detection Limit					
N/A = Not Applicable					



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Report Date: 2022/07/04

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Sampler Initials: CNN

MISCELLANEOUS (WATER)

Bureau Veritas ID		AVT914	AVT915	AVT916			
Sampling Date		2022/06/23 10:00	2022/06/23 10:05	2022/06/23 11:05			
COC Number		666640-01-01	666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-01	WL-11222680-230622- CXW-02	WL-11222680-230622- CXW-03	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	0.11	0.0050	0.0050	A621967
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	<0.0050	0.12	0.0050	0.0050	A621967
RDL = Reportable Detection Limit							

Bureau Veritas ID		AVT917	AVT918			
Sampling Date		2022/06/23 11:45	2022/06/23 17:20			
COC Number		666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-04	WL-11222680-230622- CXW-05	RDL	MDL	QC Batch

Calculated Parameters						
Total Un-ionized Hydrogen Sulfide as S	mg/L	12	0.011	0.0050	0.0050	A621967
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	13	0.012	0.0050	0.0050	A621967
RDL = Reportable Detection Limit						

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Bureau Veritas Job #: C244592

Report Date: 2022/07/04

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT914	AVT915			
Sampling Date		2022/06/23 10:00	2022/06/23 10:05			
COC Number		666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-01	WL-11222680-230622- CXW-02	RDL	MDL	QC Batch
Elements						
Total Mercury (Hg)	ug/L	<0.0019	<0.0019	0.0019	0.0019	A624979
Total Metals by ICPMS						
Total Aluminum (Al)	ug/L	116	119	3.0	0.030	A622639
Total Antimony (Sb)	ug/L	<0.50	<0.50	0.50	0.0020	A622639
Total Arsenic (As)	ug/L	0.63	0.63	0.10	0.010	A622639
Total Barium (Ba)	ug/L	23.5	22.9	1.0	0.0020	A622639
Total Beryllium (Be)	ug/L	<0.10	<0.10	0.10	0.0030	A622639
Total Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	0.0010	A622639
Total Boron (B)	ug/L	88	87	50	50	A622639
Total Cadmium (Cd)	ug/L	<0.010	<0.010	0.010	0.0020	A622639
Total Chromium (Cr)	ug/L	<1.0	<1.0	1.0	0.020	A622639
Total Cobalt (Co)	ug/L	1.97	1.89	0.20	0.20	A622639
Total Copper (Cu)	ug/L	2.19	2.09	0.50	0.030	A622639
Total Iron (Fe)	ug/L	6920	6900	10	0.70	A622639
Total Lead (Pb)	ug/L	0.36	0.35	0.20	0.0010	A622639
Total Lithium (Li)	ug/L	<2.0	<2.0	2.0	2.0	A622639
Total Manganese (Mn)	ug/L	3760	3600	1.0	0.030	A622639
Total Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	0.0020	A622639
Total Nickel (Ni)	ug/L	<1.0	<1.0	1.0	0.010	A622639
Total Phosphorus (P)	ug/L	65	62	10	1.0	A622639
Total Selenium (Se)	ug/L	<0.10	<0.10	0.10	0.0060	A622639
Total Silicon (Si)	ug/L	2480	2460	100	0.30	A622639
Total Silver (Ag)	ug/L	<0.020	<0.020	0.020	0.0020	A622639
Total Strontium (Sr)	ug/L	269	261	1.0	0.0020	A622639
Total Thallium (Tl)	ug/L	<0.010	<0.010	0.010	0.010	A622639
Total Tin (Sn)	ug/L	<5.0	<5.0	5.0	0.0050	A622639
Total Titanium (Ti)	ug/L	8.4	8.8	5.0	0.30	A622639
Total Uranium (U)	ug/L	<0.10	<0.10	0.10	0.0010	A622639
Total Vanadium (V)	ug/L	<5.0	<5.0	5.0	0.020	A622639
Total Zinc (Zn)	ug/L	<5.0	<5.0	5.0	0.050	A622639
Total Zirconium (Zr)	ug/L	0.11	0.11	0.10	0.0080	A622639
RDL = Reportable Detection Limit						



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VERITAS**

Bureau Veritas Job #: C244592

Report Date: 2022/07/04

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT914	AVT915			
Sampling Date		2022/06/23 10:00	2022/06/23 10:05			
COC Number		666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-01	WL-11222680-230622- CXW-02	RDL	MDL	QC Batch
Total Calcium (Ca)	mg/L	78.3	77.1	0.050	0.0010	A621187
Total Magnesium (Mg)	mg/L	13.9	13.3	0.050	0.00050	A621187
Total Potassium (K)	mg/L	3.66	3.58	0.050	0.0020	A621187
Total Sodium (Na)	mg/L	26.3	25.1	0.050	0.0010	A621187
Total Sulphur (S)	mg/L	21.2	19.9	3.0	1.0	A621187
RDL = Reportable Detection Limit						



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Bureau Veritas Job #: C244592

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GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT916			AVT917	AVT918			
Sampling Date		2022/06/23 11:05			2022/06/23 11:45	2022/06/23 17:20			
COC Number		666640-01-01			666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-03	RDL	MDL	WL-11222680-230622- CXW-04	WL-11222680-230622- CXW-05	RDL	MDL	QC Batch

Elements									
Total Mercury (Hg)	ug/L	<0.019 (1)	0.019	0.019	0.036 (1)	<0.019 (1)	0.019	0.019	A624218
Total Metals by ICPMS									
Total Aluminum (Al)	ug/L	758	3.0	0.030	159	13500	15	0.15	A622639
Total Antimony (Sb)	ug/L	<0.50	0.50	0.0020	<2.5	<2.5	2.5	0.010	A622639
Total Arsenic (As)	ug/L	5.22	0.10	0.010	21.5	95.5	0.50	0.050	A622639
Total Barium (Ba)	ug/L	62.1	1.0	0.0020	140	54.7	5.0	0.010	A622639
Total Beryllium (Be)	ug/L	<0.10	0.10	0.0030	<0.50	1.45	0.50	0.015	A622639
Total Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	<5.0	<5.0	5.0	0.0050	A622639
Total Boron (B)	ug/L	610	50	50	10200	1280	250	250	A622639
Total Cadmium (Cd)	ug/L	0.049	0.010	0.0020	0.184	<0.050	0.050	0.010	A622639
Total Chromium (Cr)	ug/L	4.6	1.0	0.020	14.0	9.8	5.0	0.10	A622639
Total Cobalt (Co)	ug/L	1.43	0.20	0.20	3.4	9.0	1.0	1.0	A622639
Total Copper (Cu)	ug/L	28.4	0.50	0.030	21.4	54.0	2.5	0.15	A622639
Total Iron (Fe)	ug/L	16300	10	0.70	2520	14800	50	3.5	A622639
Total Lead (Pb)	ug/L	0.58	0.20	0.0010	1.3	26.5	1.0	0.0050	A622639
Total Lithium (Li)	ug/L	<2.0	2.0	2.0	<10	72	10	10	A622639
Total Manganese (Mn)	ug/L	6300	1.0	0.030	4950	702	5.0	0.15	A622639
Total Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	<5.0	347	5.0	0.010	A622639
Total Nickel (Ni)	ug/L	2.6	1.0	0.010	15.8	17.1	5.0	0.050	A622639
Total Phosphorus (P)	ug/L	1380	10	1.0	1350	454	50	5.0	A622639
Total Selenium (Se)	ug/L	0.31	0.10	0.0060	0.59	0.89	0.50	0.030	A622639
Total Silicon (Si)	ug/L	13800	100	0.30	21200	43700	500	1.5	A622639
Total Silver (Ag)	ug/L	<0.020	0.020	0.0020	<0.10	<0.10	0.10	0.010	A622639
Total Strontium (Sr)	ug/L	780	1.0	0.0020	3030	416	5.0	0.010	A622639
Total Thallium (Tl)	ug/L	<0.010	0.010	0.010	<0.050	0.102	0.050	0.050	A622639
Total Tin (Sn)	ug/L	<5.0	5.0	0.0050	<25	<25	25	0.025	A622639
Total Titanium (Ti)	ug/L	28.3	5.0	0.30	43	181	25	1.5	A622639
Total Uranium (U)	ug/L	0.12	0.10	0.0010	0.95	169	0.50	0.0050	A622639
Total Vanadium (V)	ug/L	7.4	5.0	0.020	31	29	25	0.10	A622639
Total Zinc (Zn)	ug/L	39.2	5.0	0.050	424	97	25	0.25	A622639

RDL = Reportable Detection Limit

(1) Detection limit raised based on sample volume used and sample matrix



BUREAU
VERITAS

Bureau Veritas Job #: C244592

Report Date: 2022/07/04

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT916			AVT917	AVT918			
Sampling Date		2022/06/23 11:05			2022/06/23 11:45	2022/06/23 17:20			
COC Number		666640-01-01			666640-01-01	666640-01-01			
	UNITS	WL-11222680-230622- CXW-03	RDL	MDL	WL-11222680-230622- CXW-04	WL-11222680-230622- CXW-05	RDL	MDL	QC Batch
Total Zirconium (Zr)	ug/L	0.87	0.10	0.0080	1.99	8.88	0.50	0.040	A622639
Total Calcium (Ca)	mg/L	162	0.050	0.0010	643	24.7	0.25	0.0050	A621187
Total Magnesium (Mg)	mg/L	35.0	0.050	0.00050	54.3	11.5	0.25	0.0025	A621187
Total Potassium (K)	mg/L	10.3	0.050	0.0020	57.4	3.30	0.25	0.010	A621187
Total Sodium (Na)	mg/L	83.6	0.050	0.0010	252	909	0.25	0.0050	A621187
Total Sulphur (S)	mg/L	<3.0	3.0	1.0	264	273	15	5.0	A621187
RDL = Reportable Detection Limit									



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GENERAL COMMENTS

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C244592

Report Date: 2022/07/04

QUALITY ASSURANCE REPORT

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A623961	D10-ANTHRACENE (sur.)	2022/06/27			116	50 - 140	117	%		
A623961	D8-ACENAPHTHYLENE (sur.)	2022/06/27			114	50 - 140	111	%		
A623961	D8-NAPHTHALENE (sur.)	2022/06/27			113	50 - 140	113	%		
A623961	TERPHENYL-D14 (sur.)	2022/06/27			110	50 - 140	108	%		
A623968	O-TERPHENYL (sur.)	2022/06/27			110	60 - 140	111	%		
A621591	Biochemical Oxygen Demand	2022/06/29			95	85 - 115	<2.0	mg/L	0.82 (1)	20
A622639	Total Aluminum (Al)	2022/06/27	110	80 - 120	108	80 - 120	<3.0	ug/L	3.7 (1)	20
A622639	Total Antimony (Sb)	2022/06/27	111	80 - 120	106	80 - 120	<0.50	ug/L	NC (1)	20
A622639	Total Arsenic (As)	2022/06/27	110	80 - 120	110	80 - 120	<0.10	ug/L	0.94 (1)	20
A622639	Total Barium (Ba)	2022/06/27	107	80 - 120	105	80 - 120	<1.0	ug/L	3.2 (1)	20
A622639	Total Beryllium (Be)	2022/06/27	107	80 - 120	107	80 - 120	<0.10	ug/L	NC (1)	20
A622639	Total Bismuth (Bi)	2022/06/27	104	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
A622639	Total Boron (B)	2022/06/27	110	80 - 120	110	80 - 120	<50	ug/L	NC (1)	20
A622639	Total Cadmium (Cd)	2022/06/27	108	80 - 120	107	80 - 120	<0.010	ug/L	NC (1)	20
A622639	Total Chromium (Cr)	2022/06/27	108	80 - 120	107	80 - 120	<1.0	ug/L	3.6 (1)	20
A622639	Total Cobalt (Co)	2022/06/27	106	80 - 120	106	80 - 120	<0.20	ug/L	3.3 (1)	20
A622639	Total Copper (Cu)	2022/06/27	104	80 - 120	102	80 - 120	<0.50	ug/L	2.5 (1)	20
A622639	Total Iron (Fe)	2022/06/27	113	80 - 120	108	80 - 120	<10	ug/L	8.2 (1)	20
A622639	Total Lead (Pb)	2022/06/27	106	80 - 120	105	80 - 120	<0.20	ug/L	NC (1)	20
A622639	Total Lithium (Li)	2022/06/27	103	80 - 120	106	80 - 120	<2.0	ug/L	NC (1)	20
A622639	Total Manganese (Mn)	2022/06/27	107	80 - 120	106	80 - 120	<1.0	ug/L	4.5 (1)	20
A622639	Total Molybdenum (Mo)	2022/06/27	113	80 - 120	110	80 - 120	<1.0	ug/L	NC (1)	20
A622639	Total Nickel (Ni)	2022/06/27	106	80 - 120	104	80 - 120	<1.0	ug/L	0.83 (1)	20
A622639	Total Phosphorus (P)	2022/06/27	108	80 - 120	108	80 - 120	<10	ug/L		
A622639	Total Selenium (Se)	2022/06/27	110	80 - 120	107	80 - 120	<0.10	ug/L	NC (1)	20
A622639	Total Silicon (Si)	2022/06/27	113	80 - 120	114	80 - 120	<100	ug/L	NC (1)	20
A622639	Total Silver (Ag)	2022/06/27	106	80 - 120	102	80 - 120	<0.020	ug/L	1.4 (1)	20
A622639	Total Strontium (Sr)	2022/06/27	108	80 - 120	107	80 - 120	<1.0	ug/L	5.2 (1)	20
A622639	Total Thallium (Tl)	2022/06/27	106	80 - 120	106	80 - 120	<0.010	ug/L	NC (1)	20
A622639	Total Tin (Sn)	2022/06/27	106	80 - 120	104	80 - 120	<5.0	ug/L	NC (1)	20
A622639	Total Titanium (Ti)	2022/06/27	110	80 - 120	106	80 - 120	<5.0	ug/L	NC (1)	20



BUREAU
VERITAS

Bureau Veritas Job #: C244592

Report Date: 2022/07/04

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A622639	Total Uranium (U)	2022/06/27	109	80 - 120	109	80 - 120	<0.10	ug/L	NC (1)	20
A622639	Total Vanadium (V)	2022/06/27	107	80 - 120	106	80 - 120	<5.0	ug/L	NC (1)	20
A622639	Total Zinc (Zn)	2022/06/27	NC	80 - 120	106	80 - 120	<5.0	ug/L	3.5 (1)	20
A622639	Total Zirconium (Zr)	2022/06/27	108	80 - 120	107	80 - 120	<0.10	ug/L	NC (1)	20
A622848	Nitrate plus Nitrite (N)	2022/06/25	105	80 - 120	103	80 - 120	<0.020	mg/L	NC (1)	25
A622849	Nitrite (N)	2022/06/25	103	80 - 120	101	80 - 120	<0.0050	mg/L	NC (1)	20
A623046	Orthophosphate (P)	2022/06/25	76 (2)	80 - 120	94	80 - 120	<0.0030	mg/L	1.1 (3)	20
A623961	Acenaphthene	2022/06/27			101	50 - 140	<0.050	ug/L		
A623961	Acridine	2022/06/27			98	50 - 140	<0.050	ug/L		
A623961	Anthracene	2022/06/27			105	50 - 140	<0.010	ug/L		
A623961	Benzo(a)anthracene	2022/06/27			106	50 - 140	<0.010	ug/L		
A623961	Benzo(a)pyrene	2022/06/27			103	50 - 140	<0.0050	ug/L		
A623961	Fluoranthene	2022/06/27			100	50 - 140	<0.020	ug/L		
A623961	Fluorene	2022/06/27			105	50 - 140	<0.050	ug/L		
A623961	Naphthalene	2022/06/27			108	50 - 140	<0.10	ug/L		
A623961	Phenanthrene	2022/06/27			109	50 - 140	<0.050	ug/L		
A623961	Pyrene	2022/06/27			101	50 - 140	<0.020	ug/L		
A623968	EPH (C10-C19)	2022/06/27			101	70 - 130	<0.20	mg/L		
A623968	EPH (C19-C32)	2022/06/27			121	70 - 130	<0.20	mg/L		
A624166	Dissolved Calcium (Ca)	2022/06/29	NC (4)	80 - 120	100	80 - 120	<0.050	mg/L		
A624166	Dissolved Magnesium (Mg)	2022/06/29	NC (4)	80 - 120	99	80 - 120	<0.050	mg/L		
A624218	Total Mercury (Hg)	2022/06/27	81	80 - 120	88	80 - 120	<0.0019	ug/L	NC (1)	20
A624257	Total Sulphide	2022/06/27	112	80 - 120	119	80 - 120	<0.0018	mg/L	NC (1)	20
A624284	Total Ammonia (N)	2022/06/27	NC	80 - 120	106	80 - 120	<0.015	mg/L	0.45 (1)	20
A624620	Alkalinity (PP as CaCO3)	2022/06/25					<1.0	mg/L		
A624620	Alkalinity (Total as CaCO3)	2022/06/25			98	80 - 120	<1.0	mg/L		
A624620	Bicarbonate (HCO3)	2022/06/25					<1.0	mg/L		
A624620	Carbonate (CO3)	2022/06/25					<1.0	mg/L		
A624620	Hydroxide (OH)	2022/06/25					<1.0	mg/L		
A624622	Conductivity	2022/06/25			100	80 - 120	<2.0	uS/cm		
A624630	Conductivity	2022/06/25			101	80 - 120	<2.0	uS/cm	0 (1)	10



BUREAU
VERITAS

Bureau Veritas Job #: C244592

Report Date: 2022/07/04

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A624632	Alkalinity (PP as CaCO ₃)	2022/06/25					<1.0	mg/L	NC (1)	20
A624632	Alkalinity (Total as CaCO ₃)	2022/06/25	NC	80 - 120	99	80 - 120	<1.0	mg/L	0.25 (1)	20
A624632	Bicarbonate (HCO ₃)	2022/06/25					<1.0	mg/L	0.25 (1)	20
A624632	Carbonate (CO ₃)	2022/06/25					<1.0	mg/L	NC (1)	20
A624632	Hydroxide (OH)	2022/06/25					<1.0	mg/L	NC (1)	20
A624755	Total Sulphide	2022/06/27	NC (5)	80 - 120	115	80 - 120	<0.0018	mg/L	NC (1)	20
A624809	Chloride (Cl)	2022/06/27	NC	80 - 120	99	80 - 120	<1.0	mg/L	0.10 (1)	20
A624809	Sulphate (SO ₄)	2022/06/27	NC	80 - 120	103	80 - 120	<1.0	mg/L	0.13 (1)	20
A624895	Total Sulphide	2022/06/28	128 (6)	80 - 120	114	80 - 120	<0.0018	mg/L	NC (7)	20
A624979	Total Mercury (Hg)	2022/06/28	91	80 - 120	101	80 - 120	<0.0019	ug/L	NC (1)	20
A625051	Chemical Oxygen Demand	2022/06/29	NC	80 - 120	102	80 - 120	<10	mg/L	2.5 (1)	20
A626783	Total Suspended Solids	2022/06/30	111	80 - 120	101	80 - 120	<1.0	mg/L	0 (1)	20
A627290	Total Dissolved Solids	2022/06/30	100	80 - 120	102	80 - 120	<10	mg/L	3.2 (3)	20
A627390	Total Dissolved Solids	2022/06/30	99	80 - 120	93	80 - 120	<10	mg/L	0.90 (8)	20
A628410	Total Sulphide	2022/06/30	NC (9)	80 - 120	88	80 - 120	<0.0018	mg/L	NC (1)	20
A631991	Dissolved Calcium (Ca)	2022/07/04			102	80 - 120	<0.050	mg/L		



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Report Date: 2022/07/04

QUALITY ASSURANCE REPORT(CONT'D)

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Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CNN

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A631991	Dissolved Magnesium (Mg)	2022/07/04			103	80 - 120	<0.050	mg/L		
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement. Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference. Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy. Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination. Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency. NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration) NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL). (1) Duplicate Parent ID (2) Matrix Spike Parent ID [AVT916-03] (3) Duplicate Parent ID [AVT916-03] (4) Matrix Spike Parent ID [AVT914-06] (5) Matrix Spike Parent ID [AVT917-08] (6) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria. (7) Duplicate Parent ID [AVT914-08] (8) Duplicate Parent ID [AVT917-03] (9) Matrix Spike Parent ID [AVT918-08]										



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Sampler Initials: CNN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

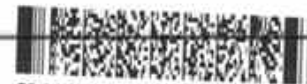


Bureau Veritas Proprietary Software
Logiciel Propriétaire de Bureau Veritas

Automated Statchk

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name	GHD Ltd	Quotation #	C10010
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #	735-002640
Address	455 PHILLIP STREET WATERLOO ON N2L 3X2	Address	Suite 100 - 138 E. 7th Ave Vancouver BC V5T 1M6	Project #	11222680
Phone	(519) 684-0510	Phone	604 248 5661	Project Name	Upland EMP
Fax	(519) 725-1394	Fax		Site #	Leachate Water
Email	APinvoices-735@ghd.com	Email	airesse.macphee@ghd.com; NationalEODSupport@ma	Sampled By	CAN



C244592_COC

Bottle Order #

606640

Project Manager

Thomas Pinchus

Regulatory Criteria:	Special Instructions	ANALYSIS REQUESTED (PLEASE BE SPECIFIC)	Turnaround Time (TAT) Required:
☒ CSR ☐ CCME ☐ BC Water Quality ☐ Other	• filtered & preserved as required • Short hold times	Conductivity, Cl, SO4, NO2, NO3, N-N, PO4, TDS, TSS, Sp. Alk Total Hardness Total Sulphide, Total H2S, Un-ionized (as H2S) - based on total Ammonia-N (Total) Total Metals with CV Hg Biochemical Oxygen Demand COD Dissolved Hardness LEPA/HEPH with subtracted PAHs Field pH Field Temperature	Regular (Standard) TAT: (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dissolved Oxygen are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) 1 Day ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐ Rush Confirmation Number: _____ (call lab for #)

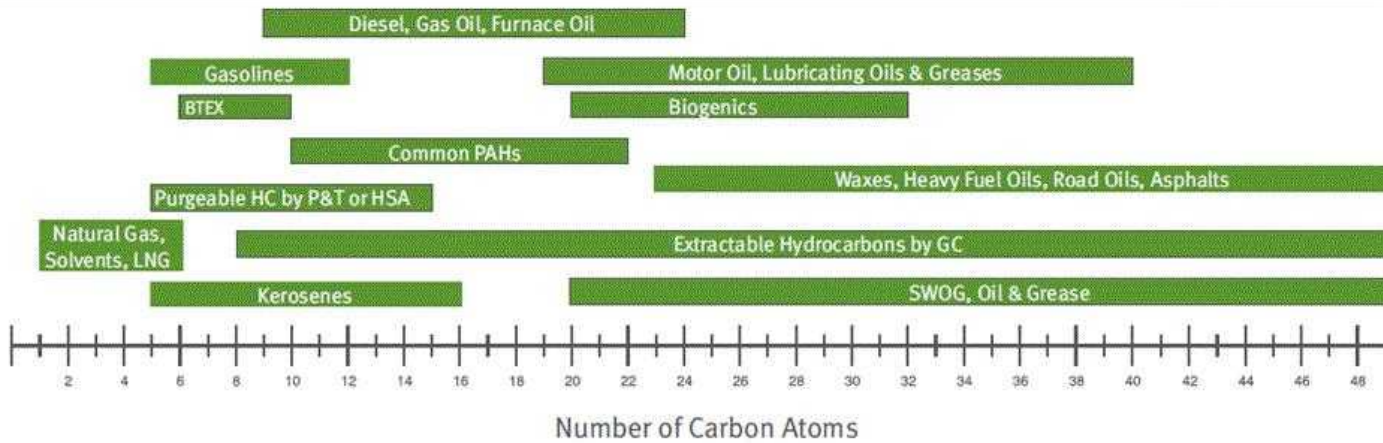
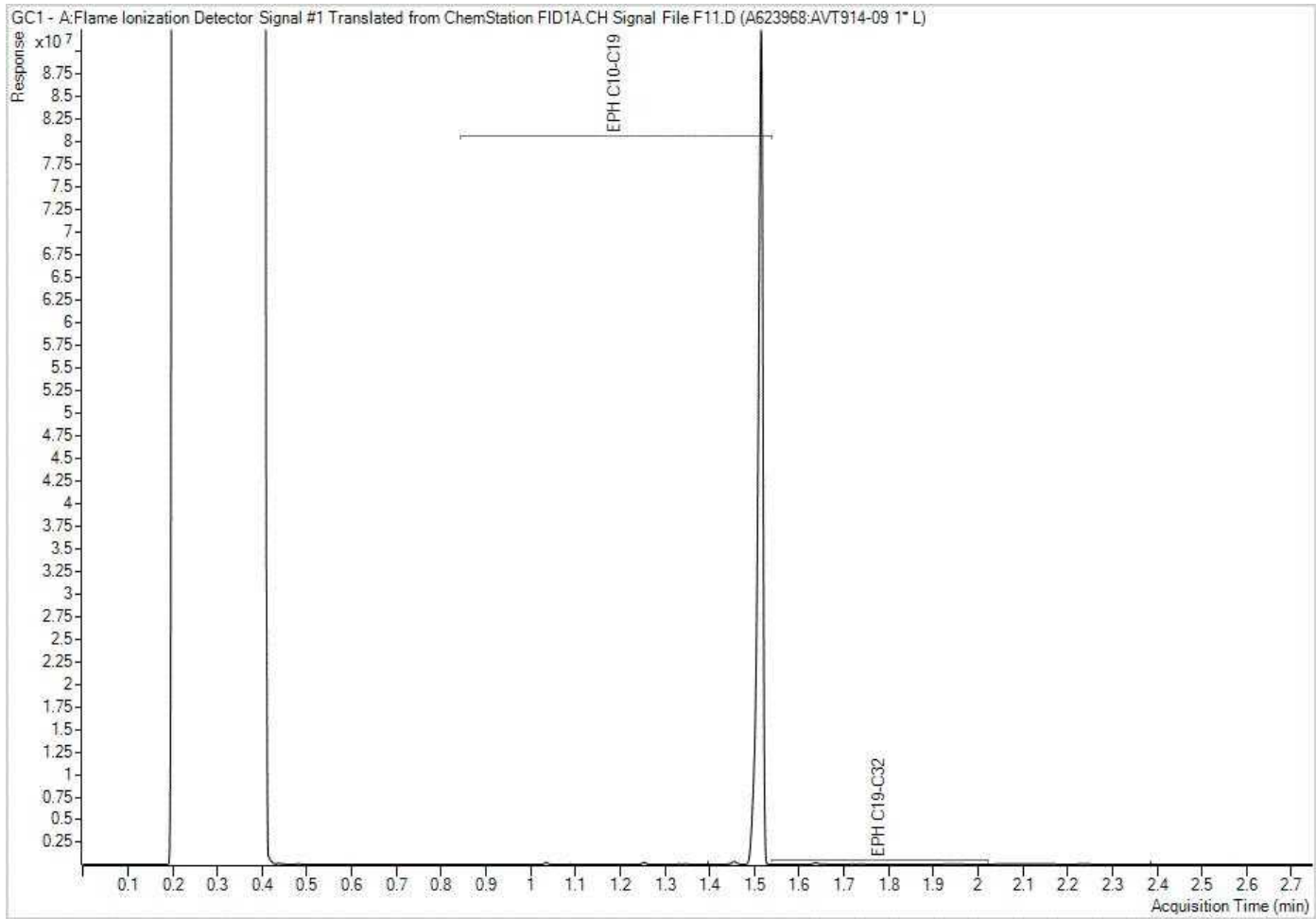
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS					Rush Confirmation Number: _____ (call lab for #)												
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Meq/L Field Filtered?	Conductivity N+N, PO4, Cl, SO4, NO2, NO3, N-N, PO4, TDS, TSS, Sp. Alk	Total Sulphide (as H2S) -	Ammonia-N (Total)	Total Metals with CV Hg	Biochemical Oxygen Demand	Dissolved Hardness	LEPA/HEPH with subtracted PAHs	Field pH	Field Temperature	# of Bottles	Comments	
1	WL-11222650-230622-CXW-01	JUL 23, 22	10:00	Leachate	Y	X	X	X	X	X	X	X	X	6.68	8.81	11	
2	WL-11222650-230622-CXW-02		10:05											6.68	8.81		
3	WL-11222650-230622-CXW-03		11:05											6.41	11.95		
4	WL-11222650-230622-CXW-04		11:45											6.85	16.10		
5	WL-11222650-230622-CXW-05		17:20											7.76	19.31		
6																	
7																	
8																	
9																	
10																	

RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only
<i>Carmy Wong</i>	22/06/24	11:05	<i>Taylor Whitehouse</i>	22/06/24	11:13		Time Sampled: ☐ Temperature (°C) on Receipt: 2, 3, 2 Custody Seal intact on Cooler? ☐ Yes ☒ No 4, 4, 6

UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS.

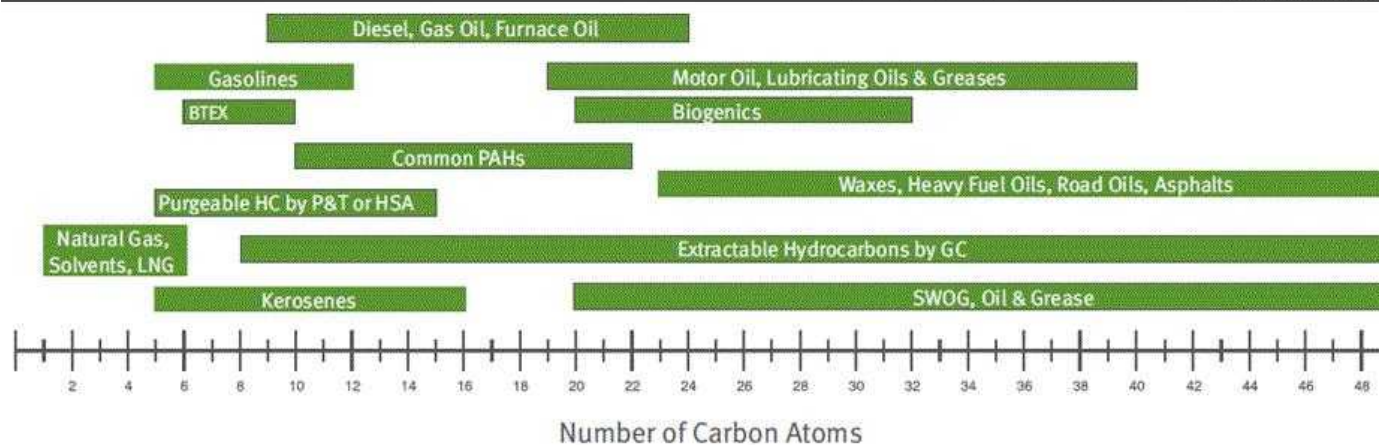
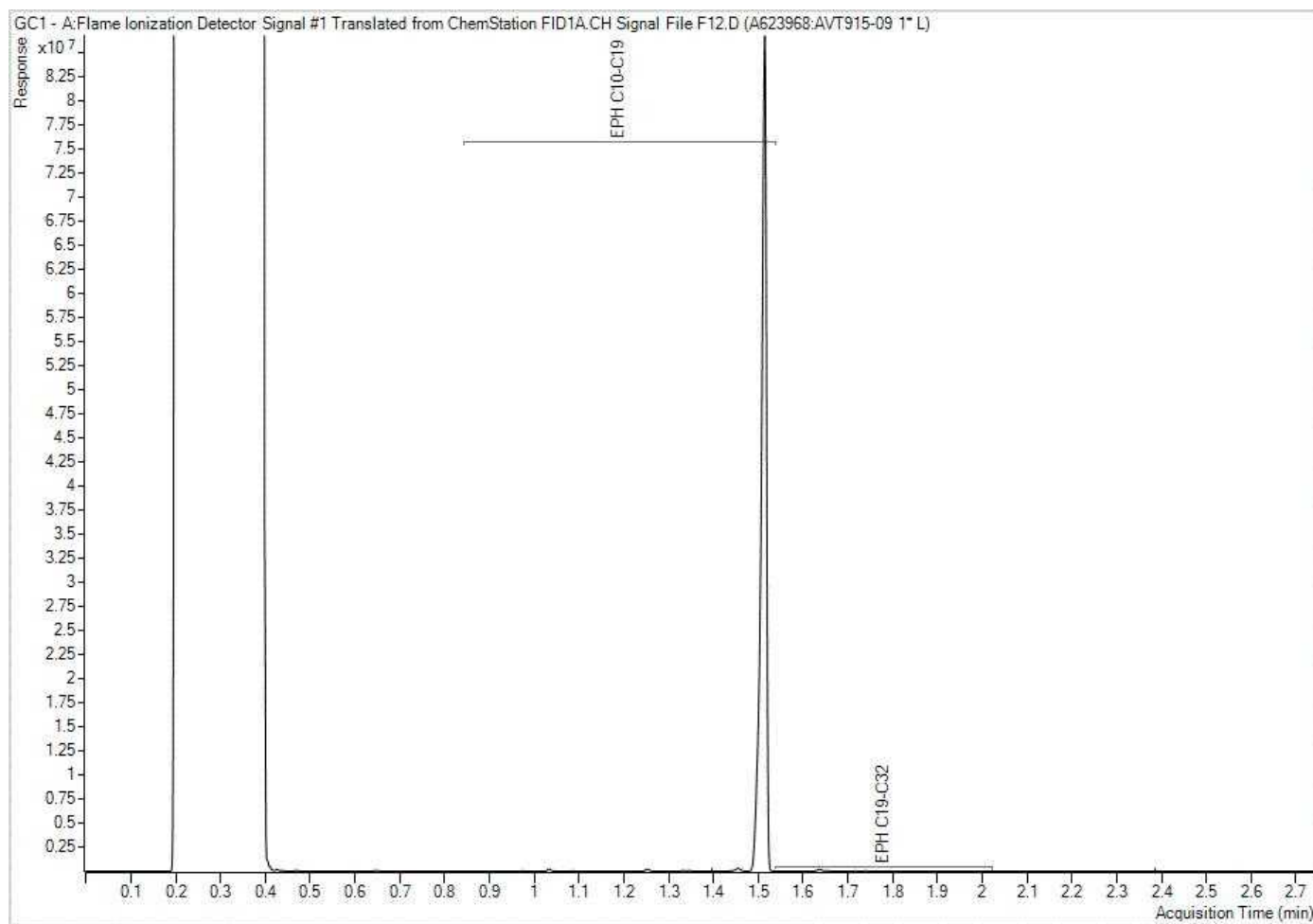
IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

EPH in Water when PAH required Chromatogram



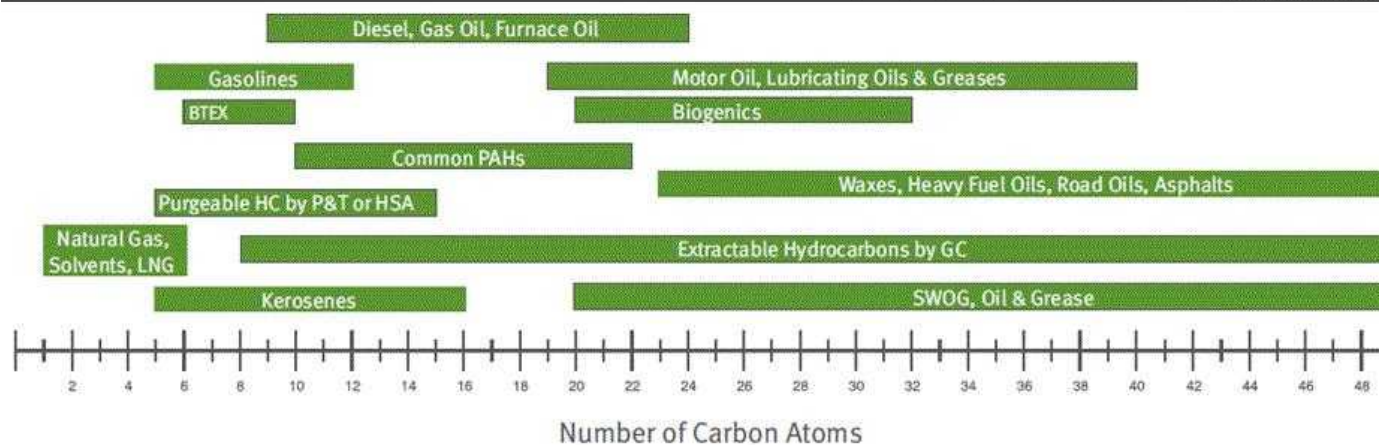
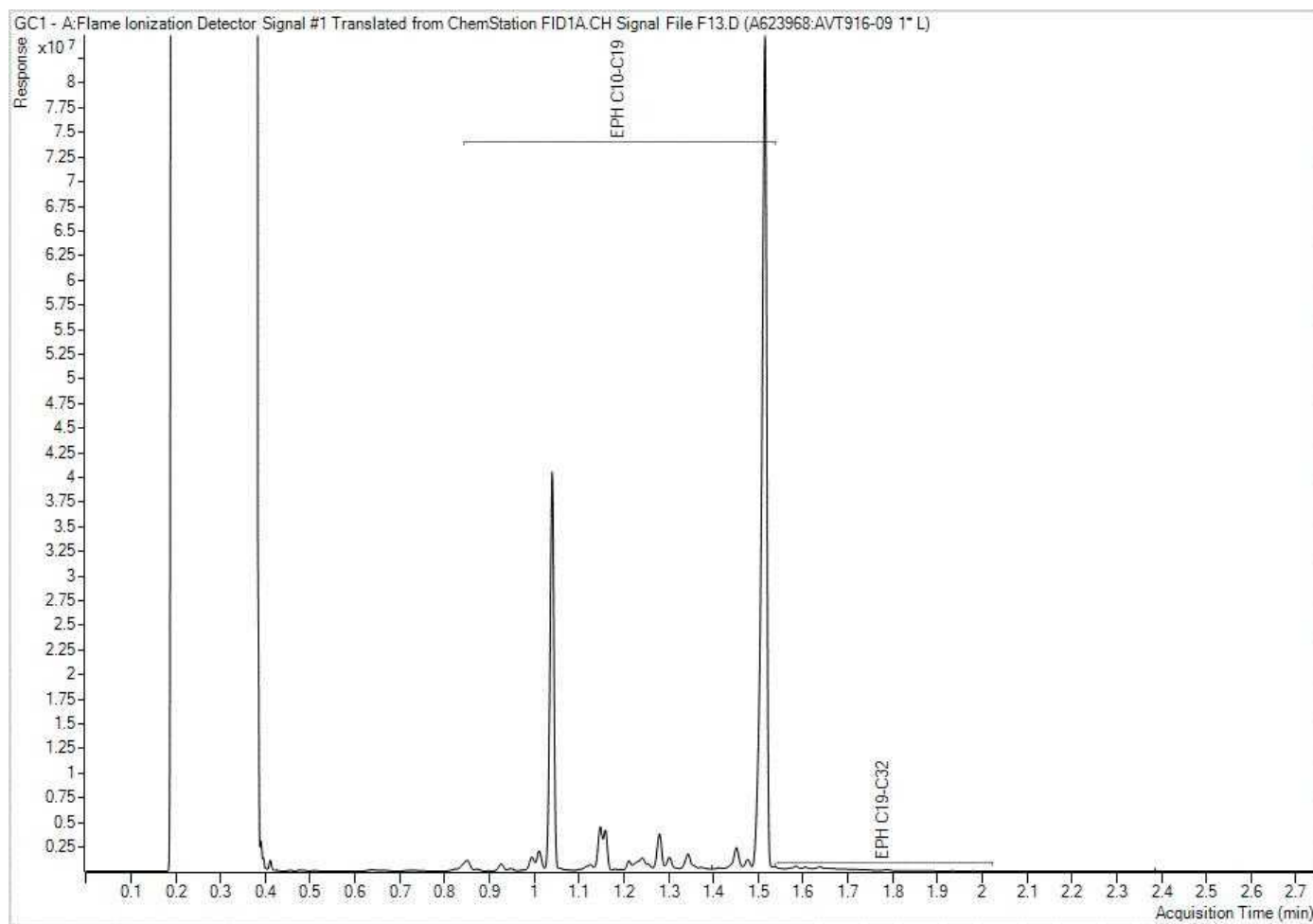
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



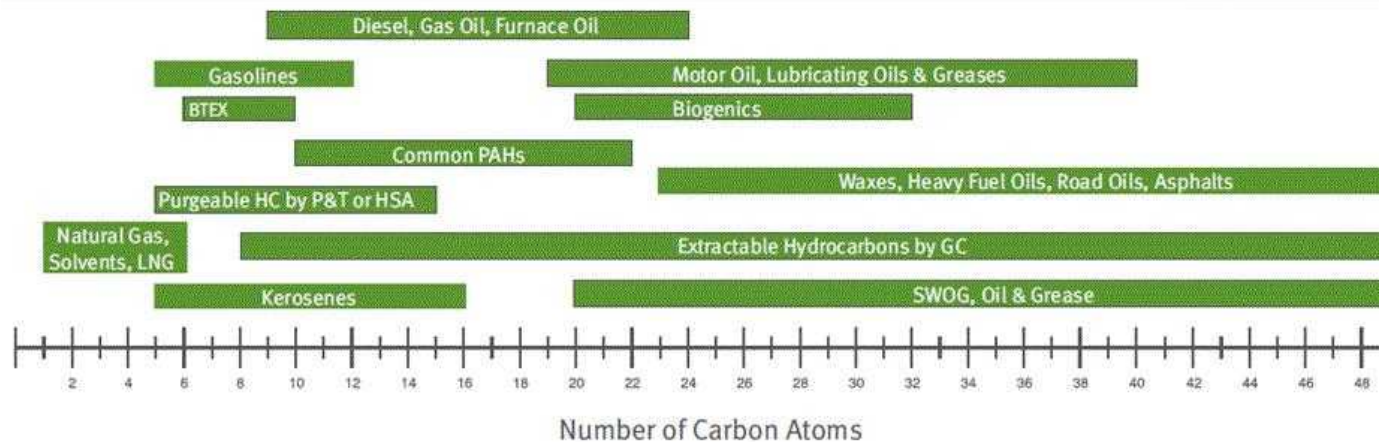
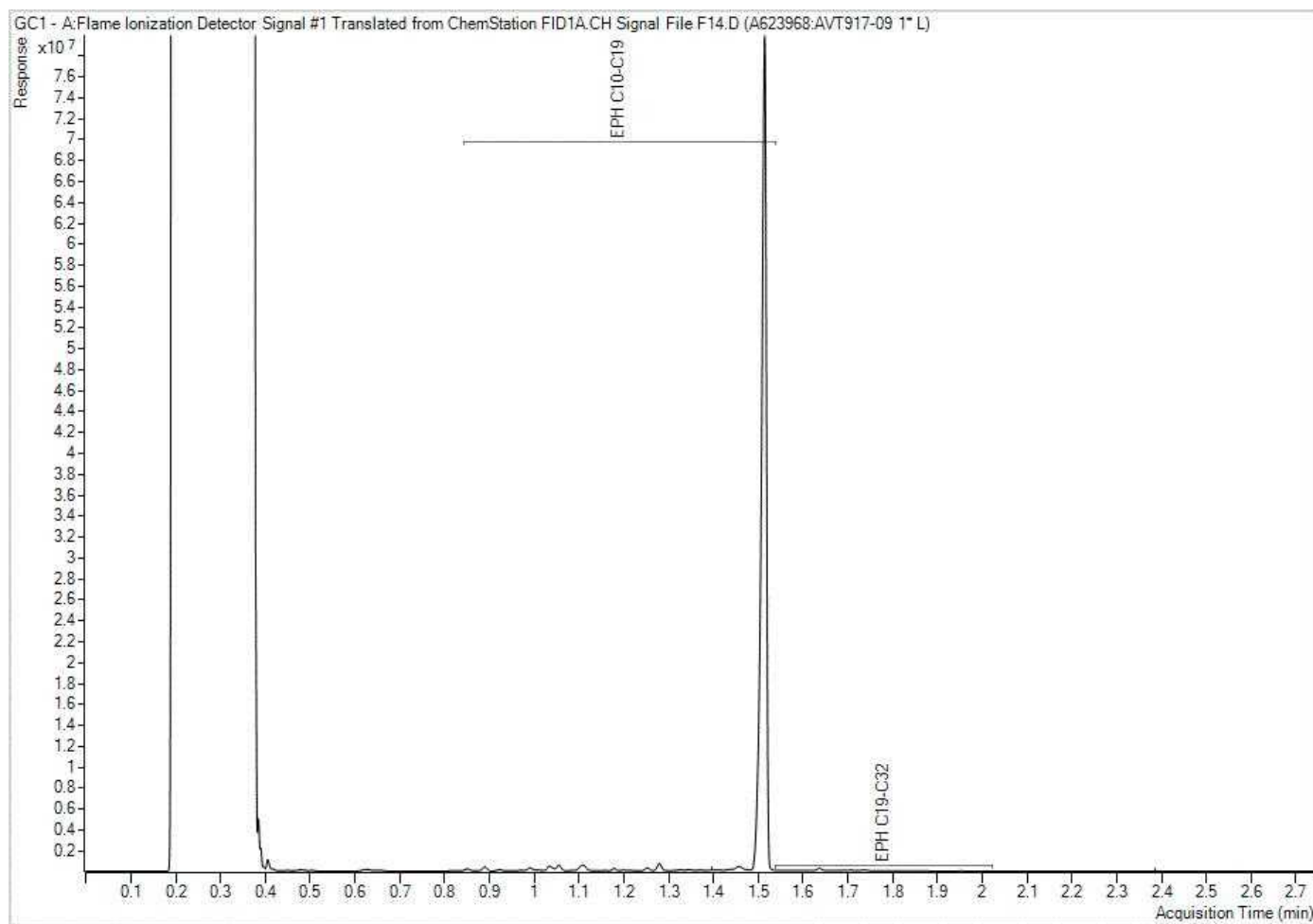
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



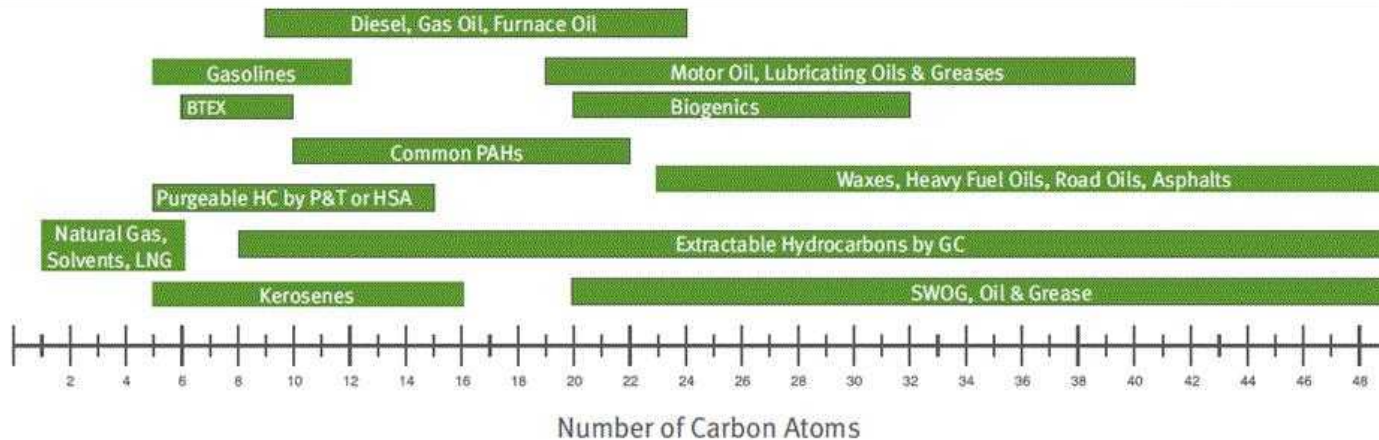
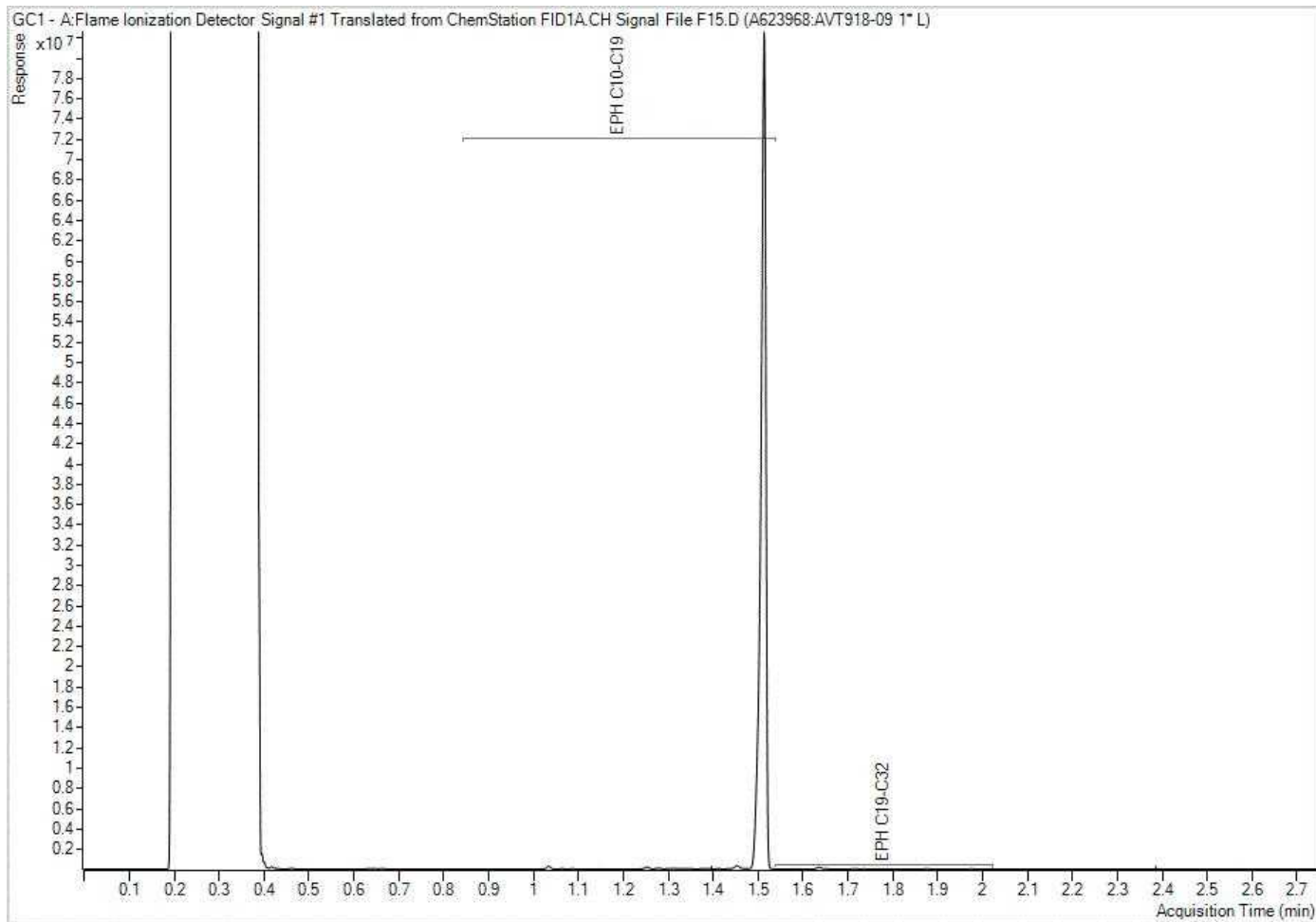
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640
Your Project #: 11222680
Site#: GROUNDWATER
Site Location: UPLAND EMP
Your C.O.C. #: C#666638-02-01

Report Date: 2022/07/06

Report #: R3195902

Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT**BUREAU VERITAS JOB #: C244598****Received: 2022/06/24, 11:13**

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	8	N/A	2022/06/25	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	8	N/A	2022/06/27	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO ₄ -E m
Conductivity @25C	8	N/A	2022/06/25	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H ₂ S) (1)	1	N/A	2022/06/27		Auto Calc
Sulphide (as H ₂ S) (1)	7	N/A	2022/06/28		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc (1)	1	N/A	2022/06/27		
Un-ionized Hydrogen Sulphide as S Calc (1)	6	N/A	2022/06/28		
Hardness (calculated as CaCO ₃)	8	N/A	2022/06/27	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (2)	8	2022/06/28	2022/06/28	AB SOP-00084	BCMOE BCLM Oct2013 m
EPH in Water when PAH required	8	2022/06/27	2022/06/27	BBY8SOP-00029	BCMOE BCLM Sep2017 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	8	N/A	2022/06/27	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (2)	8	N/A	2022/06/25	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	8	N/A	2022/06/27	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate + Nitrite (N)	8	N/A	2022/06/25	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrite (N) by CFA	8	N/A	2022/06/25	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	8	N/A	2022/06/27	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	8	2022/06/27	2022/06/27	BBY8SOP-00021	BCMOE BCLM Jul2017m
Filter and HNO ₃ Preserve for Metals	8	N/A	2022/06/24	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (3)	8	N/A	2022/06/25	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	8	N/A	2022/06/27	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Dissolved Solids (Filt. Residue)	1	2022/06/28	2022/06/29	BBY6SOP-00033	SM 23 2540 C m
Total Dissolved Solids (Filt. Residue)	7	2022/06/29	2022/06/30	BBY6SOP-00033	SM 23 2540 C m
EPH less PAH in Water by GC/FID (4)	8	N/A	2022/06/29	BBY WI-00033	Auto Calc
Field pH	7	N/A	2022/06/24		
Field Temperature	7	N/A	2022/06/24		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in



Attention: Aïresse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640
Your Project #: 11222680
Site#: GROUNDWATER
Site Location: UPLAND EMP
Your C.O.C. #: C#666638-02-01

Report Date: 2022/07/06
Report #: R3195902
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C244598

Received: 2022/06/24, 11:13

writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8
- (2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (3) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (4) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)
HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Thomas Pinchin, Project Solutions Representative

Email: Thomas.Pinchin@bureauveritas.com

Phone# (604) 734 7276

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT934	AVT935	AVT935			
Sampling Date		2022/06/22 17:20	2022/06/22 15:25	2022/06/22 15:25			
COC Number		C#666638-02-01	C#666638-02-01	C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-01	WG-11222680-220622 -CXW-06	WG-11222680-220622 -CXW-06 Lab-Dup	RDL	MDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.0050	<0.0050	N/A	0.0050	0.0050	A622849

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.656	0.363	N/A	0.020	N/A	A621392
Sulphide (as H2S)	mg/L	0.0030	<0.0020	N/A	0.0020	N/A	A621379

Field Parameters

Field pH	pH	6.97	6.86	N/A	N/A	N/A	ONSITE
Field Temperature	°C	10.81	8.95	N/A	N/A	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	520	150	N/A	2.0	N/A	A624607
Total Dissolved Solids	mg/L	410	120	N/A	10	N/A	A627290

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	N/A	1.0	N/A	A624608
Alkalinity (Total as CaCO3)	mg/L	95	58	N/A	1.0	N/A	A624608
Bicarbonate (HCO3)	mg/L	120	71	N/A	1.0	N/A	A624608
Carbonate (CO3)	mg/L	<1.0	<1.0	N/A	1.0	N/A	A624608
Hydroxide (OH)	mg/L	<1.0	<1.0	N/A	1.0	N/A	A624608
Total Sulphide	mg/L	0.0028 (1)	<0.0018 (1)	N/A	0.0018	N/A	A624755
Chloride (Cl)	mg/L	91	6.1	6.0	1.0	N/A	A624801
Sulphate (SO4)	mg/L	6.9	8.1	8.0	1.0	N/A	A624801

Nutrients

Total Ammonia (N)	mg/L	<0.015	<0.015	N/A	0.015	0.0040	A624284
Orthophosphate (P)	mg/L	0.0063	<0.0030	N/A	0.0030	0.0030	A623043
Nitrate plus Nitrite (N)	mg/L	0.656	0.363	N/A	0.020	0.020	A622848

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) A laboratory mistake resulted in adding sulfuric acid instead of NaOH and Zinc Acetate. This was recognized immediately and the correct chemicals were added. Spiking a sample impacted by this still resulted in recovery within acceptance limits. However, there is still a possibility that results could be biased low due to this mistake.



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT936	AVT937	AVT937			
Sampling Date		2022/06/22 15:50	2022/06/22 15:55	2022/06/22 15:55			
COC Number		C#666638-02-01	C#666638-02-01	C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-07	WG-11222680-220622 -CXW-08	WG-11222680-220622 -CXW-08 Lab-Dup	RDL	MDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.0050	<0.0050	N/A	0.0050	0.0050	A622849

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.052	0.051	N/A	0.020	N/A	A621392
Sulphide (as H2S)	mg/L	<0.0020	<0.0020	N/A	0.0020	N/A	A621379

Field Parameters

Field pH	pH	8.40	8.40	N/A	N/A	N/A	ONSITE
Field Temperature	°C	13.95	13.95	N/A	N/A	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	66	66	N/A	2.0	N/A	A624607
Total Dissolved Solids	mg/L	62	66	N/A	10	N/A	A627290

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	N/A	1.0	N/A	A624608
Alkalinity (Total as CaCO3)	mg/L	28	28	N/A	1.0	N/A	A624608
Bicarbonate (HCO3)	mg/L	35	34	N/A	1.0	N/A	A624608
Carbonate (CO3)	mg/L	<1.0	<1.0	N/A	1.0	N/A	A624608
Hydroxide (OH)	mg/L	<1.0	<1.0	N/A	1.0	N/A	A624608
Total Sulphide	mg/L	<0.0018 (1)	<0.0018 (1)	<0.0018	0.0018	N/A	A624755
Chloride (Cl)	mg/L	1.9	1.9	N/A	1.0	N/A	A624801
Sulphate (SO4)	mg/L	3.9	3.6	N/A	1.0	N/A	A624801

Nutrients

Total Ammonia (N)	mg/L	<0.015	<0.015	N/A	0.015	0.0040	A624284
Orthophosphate (P)	mg/L	0.028	0.029	N/A	0.0030	0.0030	A623043
Nitrate plus Nitrite (N)	mg/L	0.052	0.051	N/A	0.020	0.020	A622848

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) A laboratory mistake resulted in adding sulfuric acid instead of NaOH and Zinc Acetate. This was recognized immediately and the correct chemicals were added. Spiking a sample impacted by this still resulted in recovery within acceptance limits. However, there is still a possibility that results could be biased low due to this mistake.



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT938		AVT939	AVT939			
Sampling Date		2022/06/22 16:50		2022/06/23 08:30	2022/06/23 08:30			
COC Number		C#666638-02-01		C#666638-02-01	C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-09	QC Batch	WG-11222680-230622 -CXW-10	WG-11222680-230622 -CXW-10 Lab-Dup	RDL	MDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.0050	A622849	<0.0050	N/A	0.0050	0.0050	A622849

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.939	A621392	0.049	N/A	0.020	N/A	A621392
Sulphide (as H2S)	mg/L	<0.0020	A621379	<0.0020	N/A	0.0020	N/A	A621379

Field Parameters

Field pH	pH	7.26	ONSITE	7.55	N/A	N/A	N/A	ONSITE
Field Temperature	°C	10.47	ONSITE	3.71	N/A	N/A	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	120	A624617	63	N/A	2.0	N/A	A624617
Total Dissolved Solids	mg/L	110	A627290	34	N/A	10	N/A	A625489

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	A624618	<1.0	N/A	1.0	N/A	A624618
Alkalinity (Total as CaCO3)	mg/L	40	A624618	30	N/A	1.0	N/A	A624618
Bicarbonate (HCO3)	mg/L	49	A624618	36	N/A	1.0	N/A	A624618
Carbonate (CO3)	mg/L	<1.0	A624618	<1.0	N/A	1.0	N/A	A624618
Hydroxide (OH)	mg/L	<1.0	A624618	<1.0	N/A	1.0	N/A	A624618
Total Sulphide	mg/L	<0.0018 (1)	A624755	<0.0018	<0.0018	0.0018	N/A	A624257
Chloride (Cl)	mg/L	7.8	A624801	<1.0	N/A	1.0	N/A	A624801
Sulphate (SO4)	mg/L	3.5	A624801	3.3	N/A	1.0	N/A	A624801

Nutrients

Total Ammonia (N)	mg/L	<0.015	A624284	<0.015	<0.015	0.015	0.0040	A624789
Orthophosphate (P)	mg/L	0.0051	A623043	0.0035	N/A	0.0030	0.0030	A623046
Nitrate plus Nitrite (N)	mg/L	0.939	A622848	0.049	N/A	0.020	0.020	A622848

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) A laboratory mistake resulted in adding sulfuric acid instead of NaOH and Zinc Acetate. This was recognized immediately and the correct chemicals were added. Spiking a sample impacted by this still resulted in recovery within acceptance limits. However, there is still a possibility that results could be biased low due to this mistake.



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT940	AVT941	AVT941			
Sampling Date		2022/06/23 12:30	2022/06/23 12:35	2022/06/23 12:35			
COC Number		C#666638-02-01	C#666638-02-01	C#666638-02-01			
	UNITS	WG-11222680-230622 -CXW-11	WG-11222680-230622 -CXW-12	WG-11222680-230622 -CXW-12 Lab-Dup	RDL	MDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A622849

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	1.29	<0.020	N/A	0.020	N/A	A621392
Sulphide (as H2S)	mg/L	<0.0020	<0.0020	N/A	0.0020	N/A	A621379

Field Parameters

Field pH	pH	7.25	N/A	N/A	N/A	N/A	ONSITE
Field Temperature	°C	8.25	N/A	N/A	N/A	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	92	<2.0	N/A	2.0	N/A	A624617
Total Dissolved Solids	mg/L	56	<10	N/A	10	N/A	A627390

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	N/A	1.0	N/A	A624618
Alkalinity (Total as CaCO3)	mg/L	36	<1.0	N/A	1.0	N/A	A624618
Bicarbonate (HCO3)	mg/L	44	<1.0	N/A	1.0	N/A	A624618
Carbonate (CO3)	mg/L	<1.0	<1.0	N/A	1.0	N/A	A624618
Hydroxide (OH)	mg/L	<1.0	<1.0	N/A	1.0	N/A	A624618
Total Sulphide	mg/L	<0.0018 (1)	<0.0018 (1)	N/A	0.0018	N/A	A624755
Chloride (Cl)	mg/L	1.8	<1.0	N/A	1.0	N/A	A624801
Sulphate (SO4)	mg/L	4.2	1.3	N/A	1.0	N/A	A624801

Nutrients

Total Ammonia (N)	mg/L	<0.015	<0.015	N/A	0.015	0.0040	A624789
Orthophosphate (P)	mg/L	0.0045	<0.0030	N/A	0.0030	0.0030	A623046
Nitrate plus Nitrite (N)	mg/L	1.29	<0.020	<0.020	0.020	0.020	A622848

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) A laboratory mistake resulted in adding sulfuric acid instead of NaOH and Zinc Acetate. This was recognized immediately and the correct chemicals were added. Spiking a sample impacted by this still resulted in recovery within acceptance limits. However, there is still a possibility that results could be biased low due to this mistake.



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		AVT934	AVT935	AVT936			
Sampling Date		2022/06/22 17:20	2022/06/22 15:25	2022/06/22 15:50			
COC Number		C#666638-02-01	C#666638-02-01	C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-01	WG-11222680-220622 -CXW-06	WG-11222680-220622 -CXW-07	RDL	MDL	QC Batch
Polycyclic Aromatics							
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	0.050	A623961
Acenaphthene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A623961
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A623961
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A623961
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A623961
Acridine	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A623961
Fluoranthene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A623961
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A623961
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A623961
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A623961
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	112	119	113	N/A	N/A	A623961
D8-ACENAPHTHYLENE (sur.)	%	109	113	108	N/A	N/A	A623961
D8-NAPHTHALENE (sur.)	%	109	115	110	N/A	N/A	A623961
TERPHENYL-D14 (sur.)	%	105	110	104	N/A	N/A	A623961
RDL = Reportable Detection Limit							
N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		AVT937	AVT938	AVT939			
Sampling Date		2022/06/22 15:55	2022/06/22 16:50	2022/06/23 08:30			
COC Number		C#666638-02-01	C#666638-02-01	C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-08	WG-11222680-220622 -CXW-09	WG-11222680-230622 -CXW-10	RDL	MDL	QC Batch
Polycyclic Aromatics							
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	0.050	A623961
Acenaphthene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A623961
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A623961
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A623961
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A623961
Acridine	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A623961
Fluoranthene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A623961
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A623961
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A623961
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A623961
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	114	111	113	N/A	N/A	A623961
D8-ACENAPHTHYLENE (sur.)	%	109	105	107	N/A	N/A	A623961
D8-NAPHTHALENE (sur.)	%	113	109	111	N/A	N/A	A623961
TERPHENYL-D14 (sur.)	%	106	103	104	N/A	N/A	A623961
RDL = Reportable Detection Limit							
N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C244598
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CXW

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		AVT940	AVT941			
Sampling Date		2022/06/23 12:30	2022/06/23 12:35			
COC Number		C#666638-02-01	C#666638-02-01			
	UNITS	WG-11222680-230622 -CXW-11	WG-11222680-230622 -CXW-12	RDL	MDL	QC Batch
Polycyclic Aromatics						
Naphthalene	ug/L	<0.10	<0.10	0.10	0.050	A623961
Acenaphthene	ug/L	<0.050	<0.050	0.050	0.050	A623961
Fluorene	ug/L	<0.050	<0.050	0.050	0.050	A623961
Phenanthrene	ug/L	<0.050	<0.050	0.050	0.050	A623961
Anthracene	ug/L	<0.010	<0.010	0.010	0.010	A623961
Acridine	ug/L	<0.050	<0.050	0.050	0.050	A623961
Fluoranthene	ug/L	<0.020	<0.020	0.020	0.020	A623961
Pyrene	ug/L	<0.020	<0.020	0.020	0.020	A623961
Benzo(a)anthracene	ug/L	<0.010	<0.010	0.010	0.010	A623961
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	0.0050	0.0050	A623961
Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	110	110	N/A	N/A	A623961
D8-ACENAPHTHYLENE (sur.)	%	104	104	N/A	N/A	A623961
D8-NAPHTHALENE (sur.)	%	108	109	N/A	N/A	A623961
TERPHENYL-D14 (sur.)	%	100	102	N/A	N/A	A623961
RDL = Reportable Detection Limit N/A = Not Applicable						



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

TOTAL PETROLEUM HYDROCARBONS (WATER)

Bureau Veritas ID		AVT934	AVT935	AVT936	AVT937			
Sampling Date		2022/06/22 17:20	2022/06/22 15:25	2022/06/22 15:50	2022/06/22 15:55			
COC Number		C#666638-02-01	C#666638-02-01	C#666638-02-01	C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-01	WG-11222680-220622 -CXW-06	WG-11222680-220622 -CXW-07	WG-11222680-220622 -CXW-08	RDL	MDL	QC Batch

Calculated Parameters

LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A621401
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A621401

Ext. Pet. Hydrocarbon

EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A623968
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A623968

Surrogate Recovery (%)

O-TERPHENYL (sur.)	%	118	118	107	106	N/A	N/A	A623968

RDL = Reportable Detection Limit

N/A = Not Applicable

Bureau Veritas ID		AVT938	AVT939	AVT940	AVT941			
Sampling Date		2022/06/22 16:50	2022/06/23 08:30	2022/06/23 12:30	2022/06/23 12:35			
COC Number		C#666638-02-01	C#666638-02-01	C#666638-02-01	C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-09	WG-11222680-230622 -CXW-10	WG-11222680-230622 -CXW-11	WG-11222680-230622 -CXW-12	RDL	MDL	QC Batch

Calculated Parameters

LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A621401
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A621401

Ext. Pet. Hydrocarbon

EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A623968
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A623968

Surrogate Recovery (%)

O-TERPHENYL (sur.)	%	120	105	108	111	N/A	N/A	A623968

RDL = Reportable Detection Limit

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C244598
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CXW

MISCELLANEOUS (WATER)

Bureau Veritas ID		AVT934	AVT935	AVT936			
Sampling Date		2022/06/22 17:20	2022/06/22 15:25	2022/06/22 15:50			
COC Number		C#666638-02-01	C#666638-02-01	C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-01	WG-11222680-220622 -CXW-06	WG-11222680-220622 -CXW-07	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A621967
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A621967
RDL = Reportable Detection Limit							

Bureau Veritas ID		AVT937	AVT938	AVT939			
Sampling Date		2022/06/22 15:55	2022/06/22 16:50	2022/06/23 08:30			
COC Number		C#666638-02-01	C#666638-02-01	C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-08	WG-11222680-220622 -CXW-09	WG-11222680-230622 -CXW-10	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A621967
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A621967
RDL = Reportable Detection Limit							

Bureau Veritas ID		AVT940			
Sampling Date		2022/06/23 12:30			
COC Number		C#666638-02-01			
	UNITS	WG-11222680-230622 -CXW-11	RDL	MDL	QC Batch
Calculated Parameters					
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	0.0050	0.0050	A621967
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	0.0050	0.0050	A621967
RDL = Reportable Detection Limit					



BUREAU
VERITAS

Bureau Veritas Job #: C244598
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT934	AVT935		AVT936			
Sampling Date		2022/06/22 17:20	2022/06/22 15:25		2022/06/22 15:50			
COC Number		C#666638-02-01	C#666638-02-01		C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-01	WG-11222680-220622 -CXW-06	QC Batch	WG-11222680-220622 -CXW-07	RDL	MDL	QC Batch

Calculated Parameters

Dissolved Hardness (CaCO ₃)	mg/L	168	63.8	A621389	28.7	0.50	0.50	A621389

Elements

Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	A624988	<0.0019	0.0019	0.0019	A625324

Dissolved Metals by ICPMS

Dissolved Aluminum (Al)	ug/L	11.1	3.5	A622063	5.9	3.0	0.030	A622063
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	A622063	<0.50	0.50	0.0020	A622063
Dissolved Arsenic (As)	ug/L	0.29	0.14	A622063	0.99	0.10	0.010	A622063
Dissolved Barium (Ba)	ug/L	23.9	1.9	A622063	2.0	1.0	0.0020	A622063
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	A622063	<0.10	0.10	0.0030	A622063
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	A622063	<1.0	1.0	0.0010	A622063
Dissolved Boron (B)	ug/L	<50	<50	A622063	<50	50	50	A622063
Dissolved Cadmium (Cd)	ug/L	0.012	<0.010	A622063	<0.010	0.010	0.0020	A622063
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	A622063	<1.0	1.0	0.020	A622063
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	A622063	<0.20	0.20	0.20	A622063
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	A622063	<0.20	0.20	0.010	A622063
Dissolved Iron (Fe)	ug/L	10.0	<5.0	A622063	<5.0	5.0	0.040	A622063
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	A622063	<0.20	0.20	0.0010	A622063
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	A622063	<2.0	2.0	2.0	A622063
Dissolved Manganese (Mn)	ug/L	28.0	<1.0	A622063	<1.0	1.0	0.030	A622063
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	A622063	<1.0	1.0	0.0020	A622063
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	A622063	<1.0	1.0	0.010	A622063
Dissolved Phosphorus (P)	ug/L	14	<10	A622063	29	10	1.0	A622063
Dissolved Selenium (Se)	ug/L	<0.10	0.17	A622063	<0.10	0.10	0.0060	A622063
Dissolved Silicon (Si)	ug/L	13000	6350	A622063	4030	100	0.30	A622063
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	A622063	<0.020	0.020	0.0020	A622063
Dissolved Strontium (Sr)	ug/L	107	33.0	A622063	11.8	1.0	0.0020	A622063
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	A622063	<0.010	0.010	0.010	A622063
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	A622063	<5.0	5.0	0.0050	A622063
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	A622063	<5.0	5.0	0.30	A622063
Dissolved Uranium (U)	ug/L	<0.10	<0.10	A622063	<0.10	0.10	0.0010	A622063
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	A622063	7.1	5.0	0.020	A622063

RDL = Reportable Detection Limit



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT934	AVT935		AVT936			
Sampling Date		2022/06/22 17:20	2022/06/22 15:25		2022/06/22 15:50			
COC Number		C#666638-02-01	C#666638-02-01		C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-01	WG-11222680-220622 -CXW-06	QC Batch	WG-11222680-220622 -CXW-07	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	A622063	<5.0	5.0	0.050	A622063
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	A622063	<0.10	0.10	0.0080	A622063
Dissolved Calcium (Ca)	mg/L	42.4	19.9	A621500	9.31	0.050	0.0010	A621500
Dissolved Magnesium (Mg)	mg/L	15.0	3.45	A621500	1.32	0.050	0.00050	A621500
Dissolved Potassium (K)	mg/L	1.12	0.267	A621500	0.173	0.050	0.0020	A621500
Dissolved Sodium (Na)	mg/L	24.7	3.98	A621500	0.953	0.050	0.0010	A621500
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	A621500	<3.0	3.0	1.0	A621500
RDL = Reportable Detection Limit								

BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT937		AVT938			
Sampling Date		2022/06/22 15:55		2022/06/22 16:50			
COC Number		C#666638-02-01		C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-08	QC Batch	WG-11222680-220622 -CXW-09	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO ₃)	mg/L	28.2	A621389	49.1	0.50	0.50	A621389
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	A624988	<0.0019	0.0019	0.0019	A625305
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	6.2	A622063	4.9	3.0	0.030	A622063
Dissolved Antimony (Sb)	ug/L	<0.50	A622063	<0.50	0.50	0.0020	A622063
Dissolved Arsenic (As)	ug/L	0.97	A622063	0.15	0.10	0.010	A622063
Dissolved Barium (Ba)	ug/L	2.2	A622063	<1.0	1.0	0.0020	A622063
Dissolved Beryllium (Be)	ug/L	<0.10	A622063	<0.10	0.10	0.0030	A622063
Dissolved Bismuth (Bi)	ug/L	<1.0	A622063	<1.0	1.0	0.0010	A622063
Dissolved Boron (B)	ug/L	<50	A622063	<50	50	50	A622063
Dissolved Cadmium (Cd)	ug/L	<0.010	A622063	<0.010	0.010	0.0020	A622063
Dissolved Chromium (Cr)	ug/L	<1.0	A622063	<1.0	1.0	0.020	A622063
Dissolved Cobalt (Co)	ug/L	<0.20	A622063	<0.20	0.20	0.20	A622063
Dissolved Copper (Cu)	ug/L	<0.20	A622063	<0.20	0.20	0.010	A622063
Dissolved Iron (Fe)	ug/L	<5.0	A622063	<5.0	5.0	0.040	A622063
Dissolved Lead (Pb)	ug/L	<0.20	A622063	<0.20	0.20	0.0010	A622063
Dissolved Lithium (Li)	ug/L	<2.0	A622063	<2.0	2.0	2.0	A622063
Dissolved Manganese (Mn)	ug/L	<1.0	A622063	<1.0	1.0	0.030	A622063
Dissolved Molybdenum (Mo)	ug/L	<1.0	A622063	<1.0	1.0	0.0020	A622063
Dissolved Nickel (Ni)	ug/L	<1.0	A622063	<1.0	1.0	0.010	A622063
Dissolved Phosphorus (P)	ug/L	26	A622063	<10	10	1.0	A622063
Dissolved Selenium (Se)	ug/L	<0.10	A622063	<0.10	0.10	0.0060	A622063
Dissolved Silicon (Si)	ug/L	3970	A622063	4460	100	0.30	A622063
Dissolved Silver (Ag)	ug/L	<0.020	A622063	<0.020	0.020	0.0020	A622063
Dissolved Strontium (Sr)	ug/L	11.7	A622063	22.5	1.0	0.0020	A622063
Dissolved Thallium (Tl)	ug/L	<0.010	A622063	<0.010	0.010	0.010	A622063
Dissolved Tin (Sn)	ug/L	<5.0	A622063	<5.0	5.0	0.0050	A622063
Dissolved Titanium (Ti)	ug/L	<5.0	A622063	<5.0	5.0	0.30	A622063
Dissolved Uranium (U)	ug/L	<0.10	A622063	<0.10	0.10	0.0010	A622063
Dissolved Vanadium (V)	ug/L	7.0	A622063	<5.0	5.0	0.020	A622063
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C244598
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT937		AVT938			
Sampling Date		2022/06/22 15:55		2022/06/22 16:50			
COC Number		C#666638-02-01		C#666638-02-01			
	UNITS	WG-11222680-220622 -CXW-08	QC Batch	WG-11222680-220622 -CXW-09	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	A622063	<5.0	5.0	0.050	A622063
Dissolved Zirconium (Zr)	ug/L	<0.10	A622063	<0.10	0.10	0.0080	A622063
Dissolved Calcium (Ca)	mg/L	9.16	A621500	16.1	0.050	0.0010	A621500
Dissolved Magnesium (Mg)	mg/L	1.31	A621500	2.14	0.050	0.00050	A621500
Dissolved Potassium (K)	mg/L	0.168	A621500	0.181	0.050	0.0020	A621500
Dissolved Sodium (Na)	mg/L	0.935	A621500	1.43	0.050	0.0010	A621500
Dissolved Sulphur (S)	mg/L	<3.0	A621500	<3.0	3.0	1.0	A621500
RDL = Reportable Detection Limit							

BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT939		AVT940			
Sampling Date		2022/06/23 08:30		2022/06/23 12:30			
COC Number		C#666638-02-01		C#666638-02-01			
	UNITS	WG-11222680-230622 -CXW-10	QC Batch	WG-11222680-230622 -CXW-11	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO ₃)	mg/L	28.0	A621389	36.0	0.50	0.50	A621389
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	A624988	<0.0019	0.0019	0.0019	A625305
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	6.0	A622063	<3.0	3.0	0.030	A622063
Dissolved Antimony (Sb)	ug/L	<0.50	A622063	<0.50	0.50	0.0020	A622063
Dissolved Arsenic (As)	ug/L	0.17	A622063	<0.10	0.10	0.010	A622063
Dissolved Barium (Ba)	ug/L	1.0	A622063	<1.0	1.0	0.0020	A622063
Dissolved Beryllium (Be)	ug/L	<0.10	A622063	<0.10	0.10	0.0030	A622063
Dissolved Bismuth (Bi)	ug/L	<1.0	A622063	<1.0	1.0	0.0010	A622063
Dissolved Boron (B)	ug/L	<50	A622063	<50	50	50	A622063
Dissolved Cadmium (Cd)	ug/L	<0.010	A622063	<0.010	0.010	0.0020	A622063
Dissolved Chromium (Cr)	ug/L	<1.0	A622063	<1.0	1.0	0.020	A622063
Dissolved Cobalt (Co)	ug/L	<0.20	A622063	<0.20	0.20	0.20	A622063
Dissolved Copper (Cu)	ug/L	<0.20	A622063	<0.20	0.20	0.010	A622063
Dissolved Iron (Fe)	ug/L	7.8	A622063	<5.0	5.0	0.040	A622063
Dissolved Lead (Pb)	ug/L	<0.20	A622063	<0.20	0.20	0.0010	A622063
Dissolved Lithium (Li)	ug/L	<2.0	A622063	<2.0	2.0	2.0	A622063
Dissolved Manganese (Mn)	ug/L	1.5	A622063	<1.0	1.0	0.030	A622063
Dissolved Molybdenum (Mo)	ug/L	<1.0	A622063	<1.0	1.0	0.0020	A622063
Dissolved Nickel (Ni)	ug/L	<1.0	A622063	<1.0	1.0	0.010	A622063
Dissolved Phosphorus (P)	ug/L	<10	A622063	<10	10	1.0	A622063
Dissolved Selenium (Se)	ug/L	<0.10	A622063	<0.10	0.10	0.0060	A622063
Dissolved Silicon (Si)	ug/L	2840	A622063	8110	100	0.30	A622063
Dissolved Silver (Ag)	ug/L	<0.020	A622063	<0.020	0.020	0.0020	A622063
Dissolved Strontium (Sr)	ug/L	11.8	A622063	20.5	1.0	0.0020	A622063
Dissolved Thallium (Tl)	ug/L	<0.010	A622063	<0.010	0.010	0.010	A622063
Dissolved Tin (Sn)	ug/L	<5.0	A622063	<5.0	5.0	0.0050	A622063
Dissolved Titanium (Ti)	ug/L	<5.0	A622063	<5.0	5.0	0.30	A622063
Dissolved Uranium (U)	ug/L	<0.10	A622063	<0.10	0.10	0.0010	A622063
Dissolved Vanadium (V)	ug/L	<5.0	A622063	<5.0	5.0	0.020	A622063
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT939		AVT940			
Sampling Date		2022/06/23 08:30		2022/06/23 12:30			
COC Number		C#666638-02-01		C#666638-02-01			
	UNITS	WG-11222680-230622 -CXW-10	QC Batch	WG-11222680-230622 -CXW-11	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	A622063	<5.0	5.0	0.050	A622063
Dissolved Zirconium (Zr)	ug/L	<0.10	A622063	<0.10	0.10	0.0080	A622063
Dissolved Calcium (Ca)	mg/L	9.38	A621500	10.3	0.050	0.0010	A621500
Dissolved Magnesium (Mg)	mg/L	1.12	A621500	2.48	0.050	0.00050	A621500
Dissolved Potassium (K)	mg/L	0.129	A621500	0.160	0.050	0.0020	A621500
Dissolved Sodium (Na)	mg/L	0.702	A621500	3.26	0.050	0.0010	A621500
Dissolved Sulphur (S)	mg/L	<3.0	A621500	<3.0	3.0	1.0	A621500
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C244598
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT941			
Sampling Date		2022/06/23 12:35			
COC Number		C#666638-02-01			
	UNITS	WG-11222680-230622 -CXW-12	RDL	MDL	QC Batch

Calculated Parameters					
Dissolved Hardness (CaCO ₃)	mg/L	<0.50	0.50	0.50	A621389
Elements					
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	A624988
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	<3.0	3.0	0.030	A622063
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	0.0020	A622063
Dissolved Arsenic (As)	ug/L	<0.10	0.10	0.010	A622063
Dissolved Barium (Ba)	ug/L	<1.0	1.0	0.0020	A622063
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	0.0030	A622063
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	A622063
Dissolved Boron (B)	ug/L	<50	50	50	A622063
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	0.0020	A622063
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	0.020	A622063
Dissolved Cobalt (Co)	ug/L	<0.20	0.20	0.20	A622063
Dissolved Copper (Cu)	ug/L	<0.20	0.20	0.010	A622063
Dissolved Iron (Fe)	ug/L	<5.0	5.0	0.040	A622063
Dissolved Lead (Pb)	ug/L	<0.20	0.20	0.0010	A622063
Dissolved Lithium (Li)	ug/L	<2.0	2.0	2.0	A622063
Dissolved Manganese (Mn)	ug/L	<1.0	1.0	0.030	A622063
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	A622063
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	0.010	A622063
Dissolved Phosphorus (P)	ug/L	<10	10	1.0	A622063
Dissolved Selenium (Se)	ug/L	<0.10	0.10	0.0060	A622063
Dissolved Silicon (Si)	ug/L	<100	100	0.30	A622063
Dissolved Silver (Ag)	ug/L	<0.020	0.020	0.0020	A622063
Dissolved Strontium (Sr)	ug/L	<1.0	1.0	0.0020	A622063
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	0.010	A622063
Dissolved Tin (Sn)	ug/L	<5.0	5.0	0.0050	A622063
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	0.30	A622063
Dissolved Uranium (U)	ug/L	<0.10	0.10	0.0010	A622063
Dissolved Vanadium (V)	ug/L	<5.0	5.0	0.020	A622063
RDL = Reportable Detection Limit					



**BUREAU
VERITAS**

Bureau Veritas Job #: C244598
Report Date: 2022/07/06

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT941			
Sampling Date		2022/06/23 12:35			
COC Number		C#666638-02-01			
	UNITS	WG-11222680-230622 -CXW-12	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	0.050	A622063
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	0.0080	A622063
Dissolved Calcium (Ca)	mg/L	<0.050	0.050	0.0010	A621500
Dissolved Magnesium (Mg)	mg/L	<0.050	0.050	0.00050	A621500
Dissolved Potassium (K)	mg/L	<0.050	0.050	0.0020	A621500
Dissolved Sodium (Na)	mg/L	<0.050	0.050	0.0010	A621500
Dissolved Sulphur (S)	mg/L	<3.0	3.0	1.0	A621500
RDL = Reportable Detection Limit					



**BUREAU
VERITAS**

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

GENERAL COMMENTS

Version 2: Report reissued to include results for dissolved phosphorus on samples requesting dissolved metals on 2022/07/06

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A623961	D10-ANTHRACENE (sur.)	2022/06/27			116	50 - 140	117	%		
A623961	D8-ACENAPHTHYLENE (sur.)	2022/06/27			114	50 - 140	111	%		
A623961	D8-NAPHTHALENE (sur.)	2022/06/27			113	50 - 140	113	%		
A623961	TERPHENYL-D14 (sur.)	2022/06/27			110	50 - 140	108	%		
A623968	O-TERPHENYL (sur.)	2022/06/27			110	60 - 140	111	%		
A622063	Dissolved Aluminum (Al)	2022/06/27	102	80 - 120	102	80 - 120	<3.0	ug/L	NC (2)	20
A622063	Dissolved Antimony (Sb)	2022/06/27	104	80 - 120	102	80 - 120	<0.50	ug/L	NC (2)	20
A622063	Dissolved Arsenic (As)	2022/06/27	NC	80 - 120	104	80 - 120	<0.10	ug/L	0.34 (2)	20
A622063	Dissolved Barium (Ba)	2022/06/27	NC	80 - 120	99	80 - 120	<1.0	ug/L	2.7 (2)	20
A622063	Dissolved Beryllium (Be)	2022/06/27	103	80 - 120	101	80 - 120	<0.10	ug/L	NC (2)	20
A622063	Dissolved Bismuth (Bi)	2022/06/27	92	80 - 120	99	80 - 120	<1.0	ug/L	NC (2)	20
A622063	Dissolved Boron (B)	2022/06/27	NC	80 - 120	100	80 - 120	<50	ug/L	1.2 (2)	20
A622063	Dissolved Cadmium (Cd)	2022/06/27	101	80 - 120	101	80 - 120	<0.010	ug/L	NC (2)	20
A622063	Dissolved Chromium (Cr)	2022/06/27	98	80 - 120	99	80 - 120	<1.0	ug/L	NC (2)	20
A622063	Dissolved Cobalt (Co)	2022/06/27	96	80 - 120	98	80 - 120	<0.20	ug/L	NC (2)	20
A622063	Dissolved Copper (Cu)	2022/06/27	91	80 - 120	96	80 - 120	<0.20	ug/L	NC (2)	20
A622063	Dissolved Iron (Fe)	2022/06/27	98	80 - 120	101	80 - 120	<5.0	ug/L	1.0 (2)	20
A622063	Dissolved Lead (Pb)	2022/06/27	102	80 - 120	102	80 - 120	<0.20	ug/L	NC (2)	20
A622063	Dissolved Lithium (Li)	2022/06/27	NC	80 - 120	100	80 - 120	<2.0	ug/L	0.32 (2)	20
A622063	Dissolved Manganese (Mn)	2022/06/27	NC	80 - 120	98	80 - 120	<1.0	ug/L	0.33 (2)	20
A622063	Dissolved Molybdenum (Mo)	2022/06/27	111	80 - 120	106	80 - 120	<1.0	ug/L	NC (2)	20
A622063	Dissolved Nickel (Ni)	2022/06/27	94	80 - 120	98	80 - 120	<1.0	ug/L	NC (2)	20
A622063	Dissolved Phosphorus (P)	2022/06/25	106	80 - 120	102	80 - 120	<10	ug/L		
A622063	Dissolved Selenium (Se)	2022/06/27	70 (1)	80 - 120	99	80 - 120	<0.10	ug/L	NC (2)	20
A622063	Dissolved Silicon (Si)	2022/06/27	103	80 - 120	111	80 - 120	<100	ug/L	1.4 (2)	20
A622063	Dissolved Silver (Ag)	2022/06/27	86	80 - 120	98	80 - 120	<0.020	ug/L	NC (2)	20
A622063	Dissolved Strontium (Sr)	2022/06/27	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.69 (2)	20
A622063	Dissolved Thallium (Tl)	2022/06/27	100	80 - 120	98	80 - 120	<0.010	ug/L	NC (2)	20
A622063	Dissolved Tin (Sn)	2022/06/27	101	80 - 120	100	80 - 120	<5.0	ug/L	NC (2)	20
A622063	Dissolved Titanium (Ti)	2022/06/27	101	80 - 120	103	80 - 120	<5.0	ug/L	NC (2)	20
A622063	Dissolved Uranium (U)	2022/06/27	105	80 - 120	102	80 - 120	<0.10	ug/L	NC (2)	20



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A622063	Dissolved Vanadium (V)	2022/06/27	101	80 - 120	99	80 - 120	<5.0	ug/L	NC (2)	20
A622063	Dissolved Zinc (Zn)	2022/06/27	102	80 - 120	104	80 - 120	<5.0	ug/L	NC (2)	20
A622063	Dissolved Zirconium (Zr)	2022/06/27	106	80 - 120	101	80 - 120	<0.10	ug/L	NC (2)	20
A622848	Nitrate plus Nitrite (N)	2022/06/25	105 (3)	80 - 120	103	80 - 120	<0.020	mg/L	NC (4)	25
A622849	Nitrite (N)	2022/06/25	103 (3)	80 - 120	101	80 - 120	<0.0050	mg/L	NC (4)	20
A623043	Orthophosphate (P)	2022/06/25			91	80 - 120	<0.0030	mg/L		
A623046	Orthophosphate (P)	2022/06/25	76	80 - 120	94	80 - 120	<0.0030	mg/L	1.1 (2)	20
A623961	Acenaphthene	2022/06/27			101	50 - 140	<0.050	ug/L		
A623961	Acridine	2022/06/27			98	50 - 140	<0.050	ug/L		
A623961	Anthracene	2022/06/27			105	50 - 140	<0.010	ug/L		
A623961	Benzo(a)anthracene	2022/06/27			106	50 - 140	<0.010	ug/L		
A623961	Benzo(a)pyrene	2022/06/27			103	50 - 140	<0.0050	ug/L		
A623961	Fluoranthene	2022/06/27			100	50 - 140	<0.020	ug/L		
A623961	Fluorene	2022/06/27			105	50 - 140	<0.050	ug/L		
A623961	Naphthalene	2022/06/27			108	50 - 140	<0.10	ug/L		
A623961	Phenanthrene	2022/06/27			109	50 - 140	<0.050	ug/L		
A623961	Pyrene	2022/06/27			101	50 - 140	<0.020	ug/L		
A623968	EPH (C10-C19)	2022/06/27			101	70 - 130	<0.20	mg/L		
A623968	EPH (C19-C32)	2022/06/27			121	70 - 130	<0.20	mg/L		
A624257	Total Sulphide	2022/06/27	112	80 - 120	119	80 - 120	<0.0018	mg/L	NC (5)	20
A624284	Total Ammonia (N)	2022/06/27	NC	80 - 120	106	80 - 120	<0.015	mg/L	0.45 (2)	20
A624607	Conductivity	2022/06/24			101	80 - 120	<2.0	uS/cm		
A624608	Alkalinity (PP as CaCO3)	2022/06/24					<1.0	mg/L	7.0 (2)	20
A624608	Alkalinity (Total as CaCO3)	2022/06/24	NC	80 - 120	98	80 - 120	<1.0	mg/L	1.2 (2)	20
A624608	Bicarbonate (HCO3)	2022/06/24					<1.0	mg/L	1.4 (2)	20
A624608	Carbonate (CO3)	2022/06/24					<1.0	mg/L	7.0 (2)	20
A624608	Hydroxide (OH)	2022/06/24					<1.0	mg/L	NC (2)	20
A624617	Conductivity	2022/06/25			100	80 - 120	<2.0	uS/cm	0 (2)	10
A624618	Alkalinity (PP as CaCO3)	2022/06/25					<1.0	mg/L	NC (2)	20
A624618	Alkalinity (Total as CaCO3)	2022/06/25	97	80 - 120	98	80 - 120	<1.0	mg/L	1.5 (2)	20
A624618	Bicarbonate (HCO3)	2022/06/25					<1.0	mg/L	1.5 (2)	20



**BUREAU
VERITAS**

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A624618	Carbonate (CO ₃)	2022/06/25					<1.0	mg/L	NC (2)	20
A624618	Hydroxide (OH)	2022/06/25					<1.0	mg/L	NC (2)	20
A624755	Total Sulphide	2022/06/27	NC	80 - 120	115	80 - 120	<0.0018	mg/L	NC (6)	20
A624789	Total Ammonia (N)	2022/06/27	104 (7)	80 - 120	101	80 - 120	<0.015	mg/L	NC (8)	20
A624801	Chloride (Cl)	2022/06/27	103 (9)	80 - 120	98	80 - 120	<1.0	mg/L	2.9 (10)	20
A624801	Sulphate (SO ₄)	2022/06/27	105 (9)	80 - 120	103	80 - 120	<1.0	mg/L	1.1 (10)	20
A624988	Dissolved Mercury (Hg)	2022/06/28	93	80 - 120	100	80 - 120	<0.0019	ug/L	NC (2)	20
A625305	Dissolved Mercury (Hg)	2022/06/28	96	80 - 120	101	80 - 120	<0.0019	ug/L	NC (2)	20
A625324	Dissolved Mercury (Hg)	2022/06/28	99	80 - 120	99	80 - 120	<0.0019	ug/L	NC (2)	20
A625489	Total Dissolved Solids	2022/06/29	103	80 - 120	105	80 - 120	<10	mg/L	0.83 (2)	20
A627290	Total Dissolved Solids	2022/06/30	100	80 - 120	102	80 - 120	<10	mg/L	3.2 (2)	20



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A627390	Total Dissolved Solids	2022/06/30	99	80 - 120	93	80 - 120	<10	mg/L	0.90 (2)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Duplicate Parent ID

(3) Matrix Spike Parent ID [AVT941-01]

(4) Duplicate Parent ID [AVT941-01]

(5) Duplicate Parent ID [AVT939-05]

(6) Duplicate Parent ID [AVT937-05]

(7) Matrix Spike Parent ID [AVT939-06]

(8) Duplicate Parent ID [AVT939-06]

(9) Matrix Spike Parent ID [AVT935-01]

(10) Duplicate Parent ID [AVT935-01]



BUREAU
VERITAS

Bureau Veritas Job #: C244598

Report Date: 2022/07/06

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics



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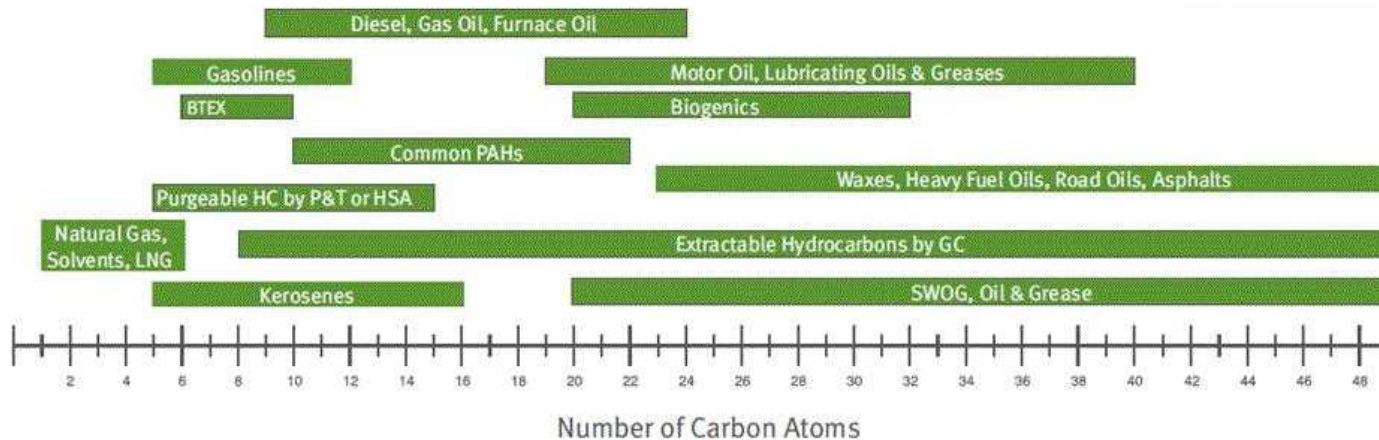
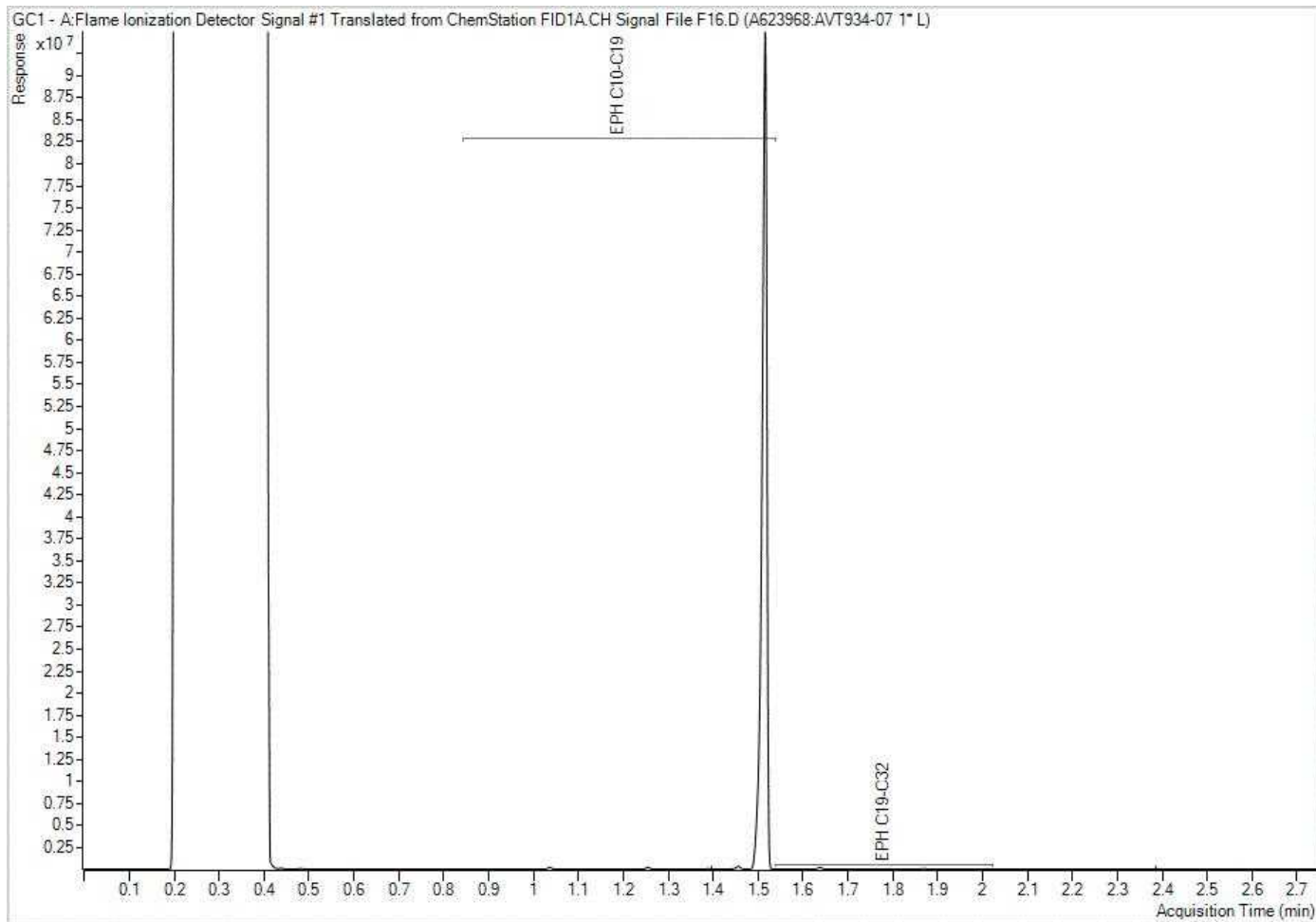
Bureau Veritas
4506 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll-free: 800-563-6266 Fax: (604) 731 2386 www.bvna.com

Page 1 of 1

INVOICE TO:		Report Information		Project Information		Chain Of Custody Record													
Company Name	#163 GHD Limited	Company Name	GHD Ltd.	Quotation #	C10010	Bottle Order #:													
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #	735-002640	66638													
Address	455 PHILLIP STREET WATERLOO ON N2L 3X2	Address	Suite 100 - 138 E. 7th Ave Vancouver, BC V5T 1M6	Project #	11222680	Project Manager													
Phone	(519) 884-0510	Phone	604 248 3661	Project Name	Upland EMP	Thomas Pinchin													
Email	APInvoices-735@ghd.com	Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Site #	Groundwater	CR066638-02-01													
Regulatory Criteria:		Special Instructions:		ANALYSIS REQUESTED (PLEASE BE SPECIFIC):		Turnaround Time (TAT) Required:													
☒ CSR ☐ CCME ☐ BC Water Quality ☐ Other		Filtered & preserved as required - Short hold times - same cooler as other COC		Conductivity, Cl, SO4, NO2, NO3, N+H, PO4 Orthophosphate Speciated Alkalinity Sulphide + H2S Calc Sulphide, Un-ionized (as H2S) (Calc) Ammonia-N (Total) Dissolved Metals with CV Hg. Hardness Total Dissolved Solids (Filt. Residue) LEPH/HEPH with subtracted PAHs Field pH Field Temperature		Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐ Rush Confirmation Number: ☐ (call lab for #)													
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS																			
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metal Field Filtered? (Y/N)	ANALYSIS REQUESTED (PLEASE BE SPECIFIC):												# of Bottles	Comments
W6-11222680-220622-CXW-01		June 22, 2022	1720	GW	Y	X	X	X	X	X	X	X	X	X	X	6.97	10.81	7	
W6-11222680-220622-CXW-06			1525													6.86	8.95		
W6-11222680-220622-CXW-07			1550													8.40	13.95		
W6-11222680-220622-CXW-08			1555													8.40	13.95		
W6-11222680-220622-CXW-09			1650													7.26	12.43		
W6-11222680-230622-CXW-10		June 23, 2022	0830													7.55	3.71		
W6-11222680-230622-CXW-11			1230													7.25	8.25		
W6-11222680-230622-CXW-12			1235	OTHER	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	NA		
RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# jars used and not submitted		Lab Use Only		Custody Seal Intact on Cooler?		White Bureau Veritas Yellow Client					
CARMY WONG		22/06/24	1105	TAYLOR WHITEHOUSE		22/06/24	11:13			Time Sensitive ☐ Temperature (°C) on Receipt: 23.2 4, 5, 6		☐ Yes ☒ No							

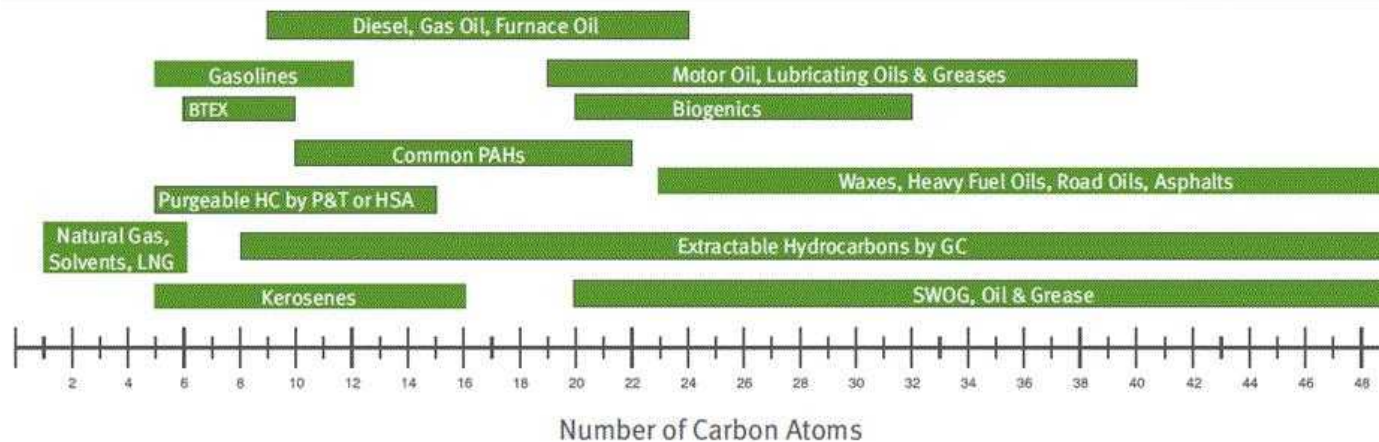
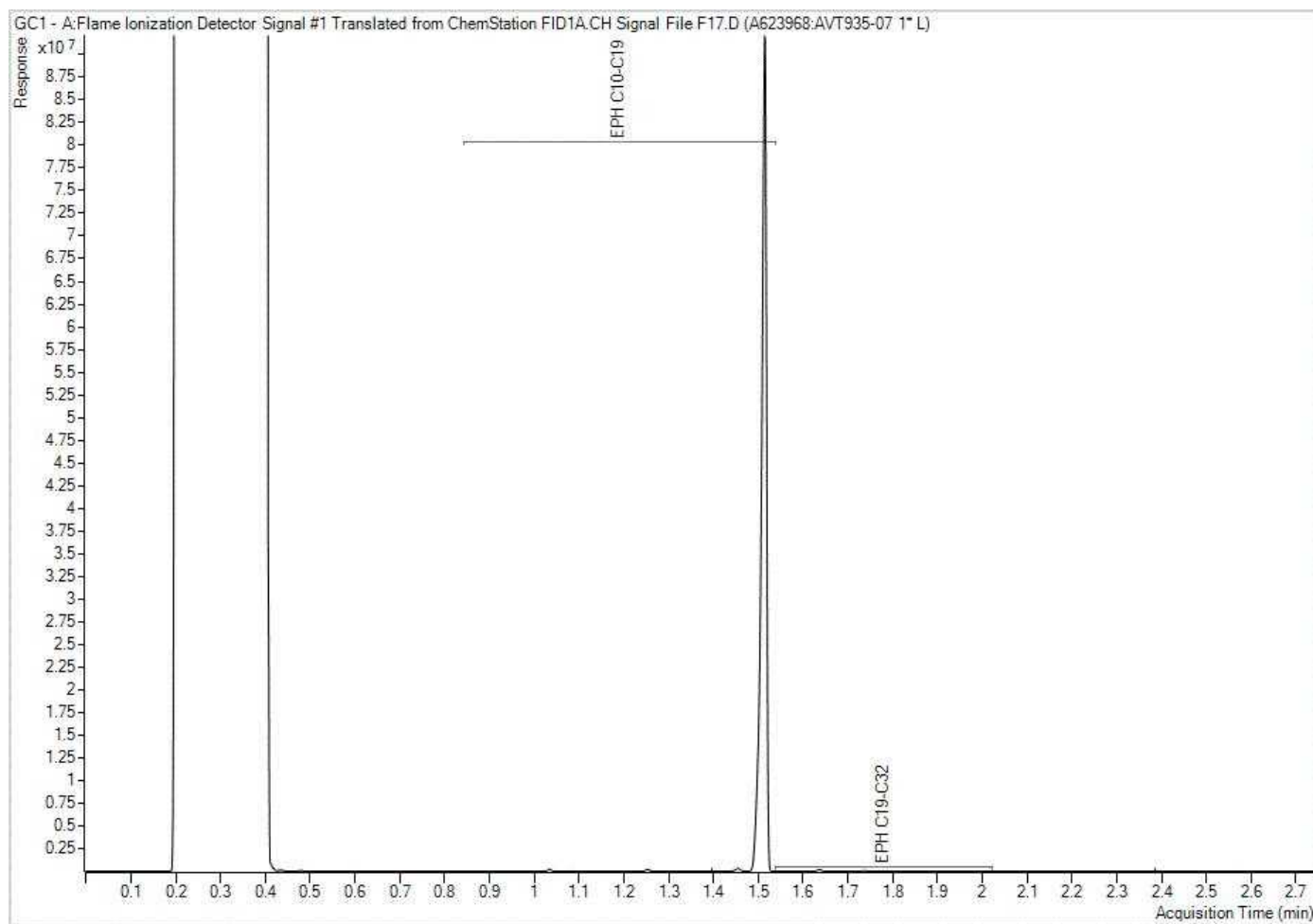
Bureau Veritas Canada (2019) Inc.

EPH in Water when PAH required Chromatogram



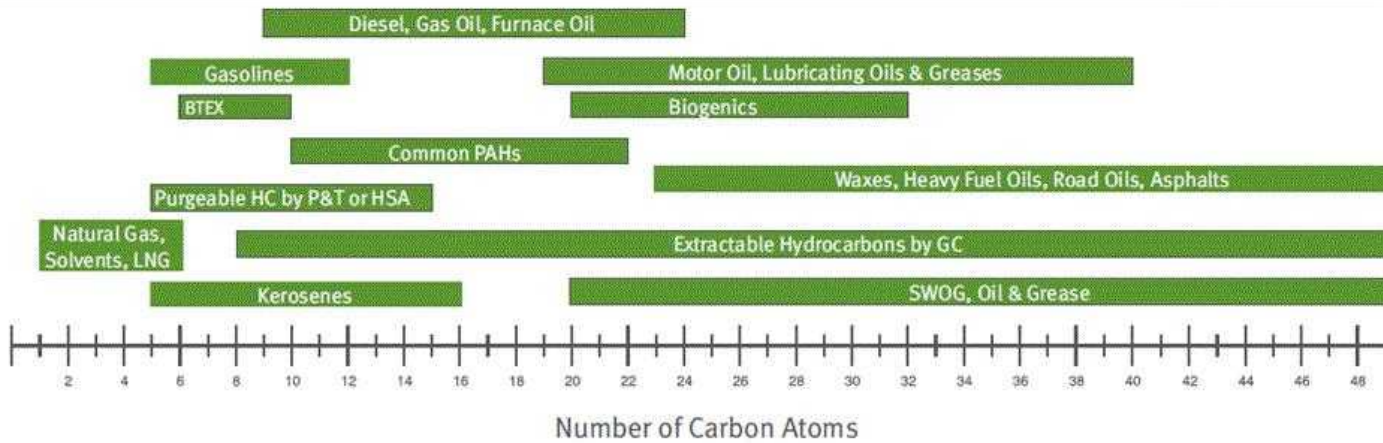
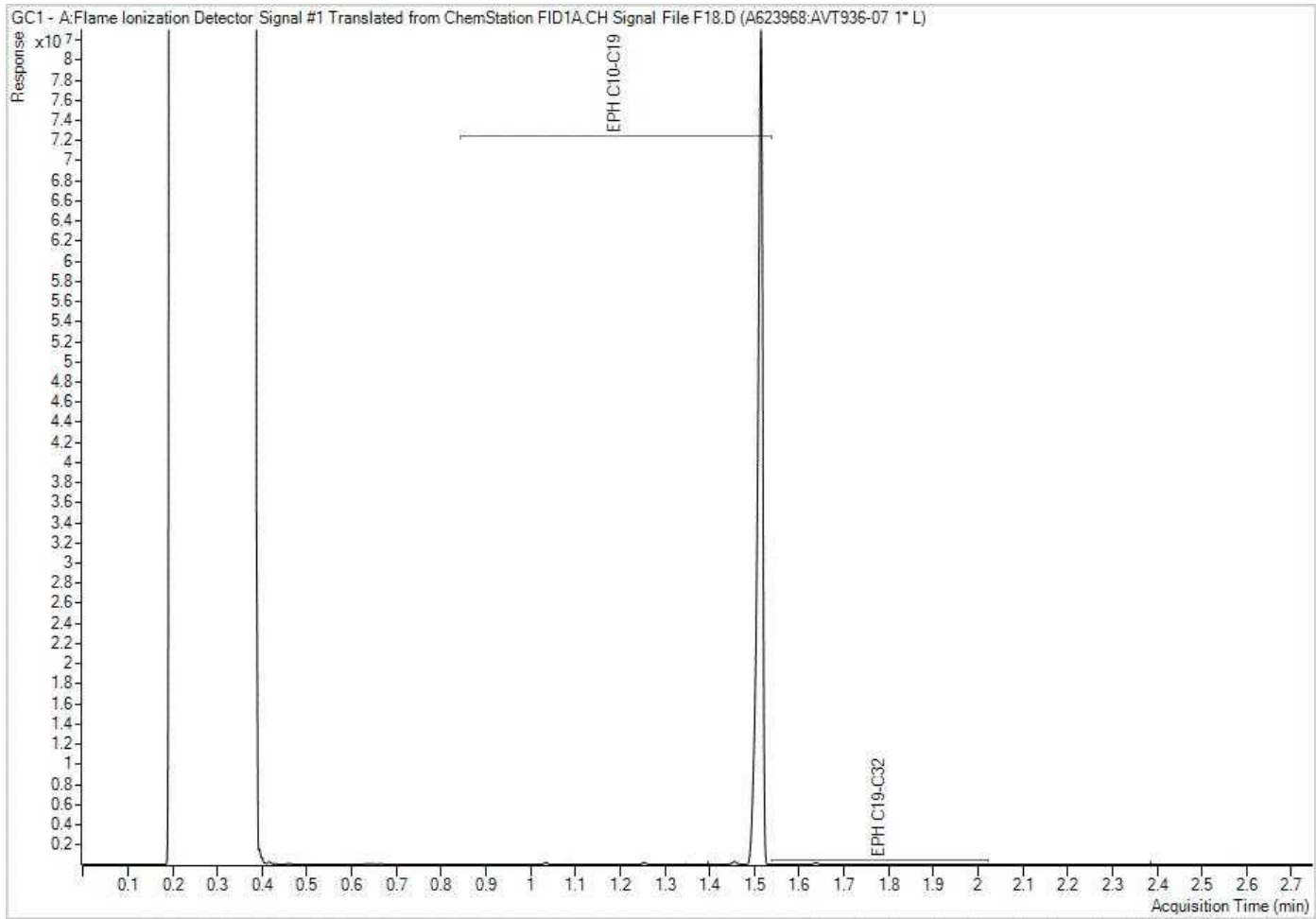
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



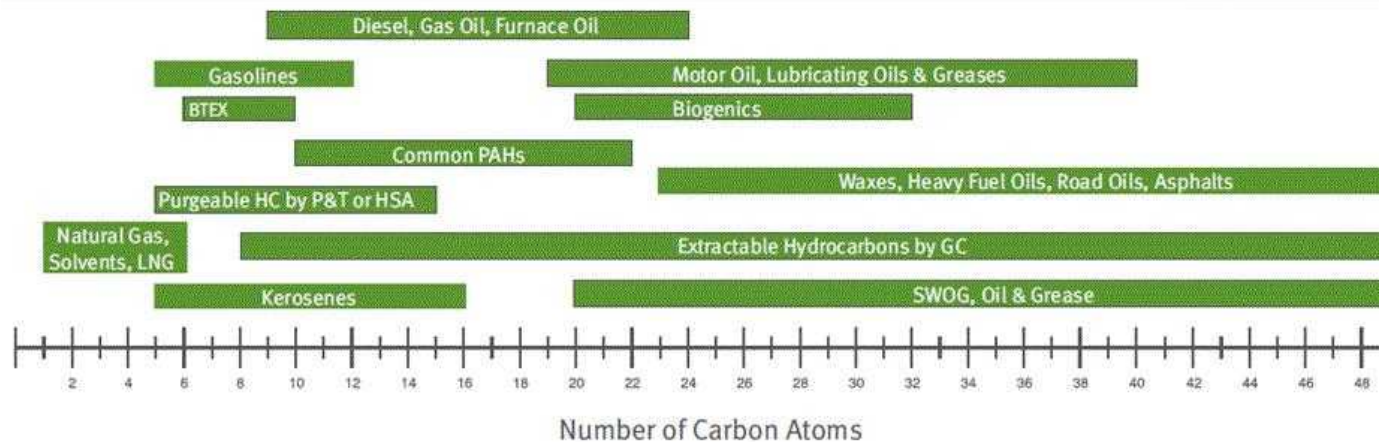
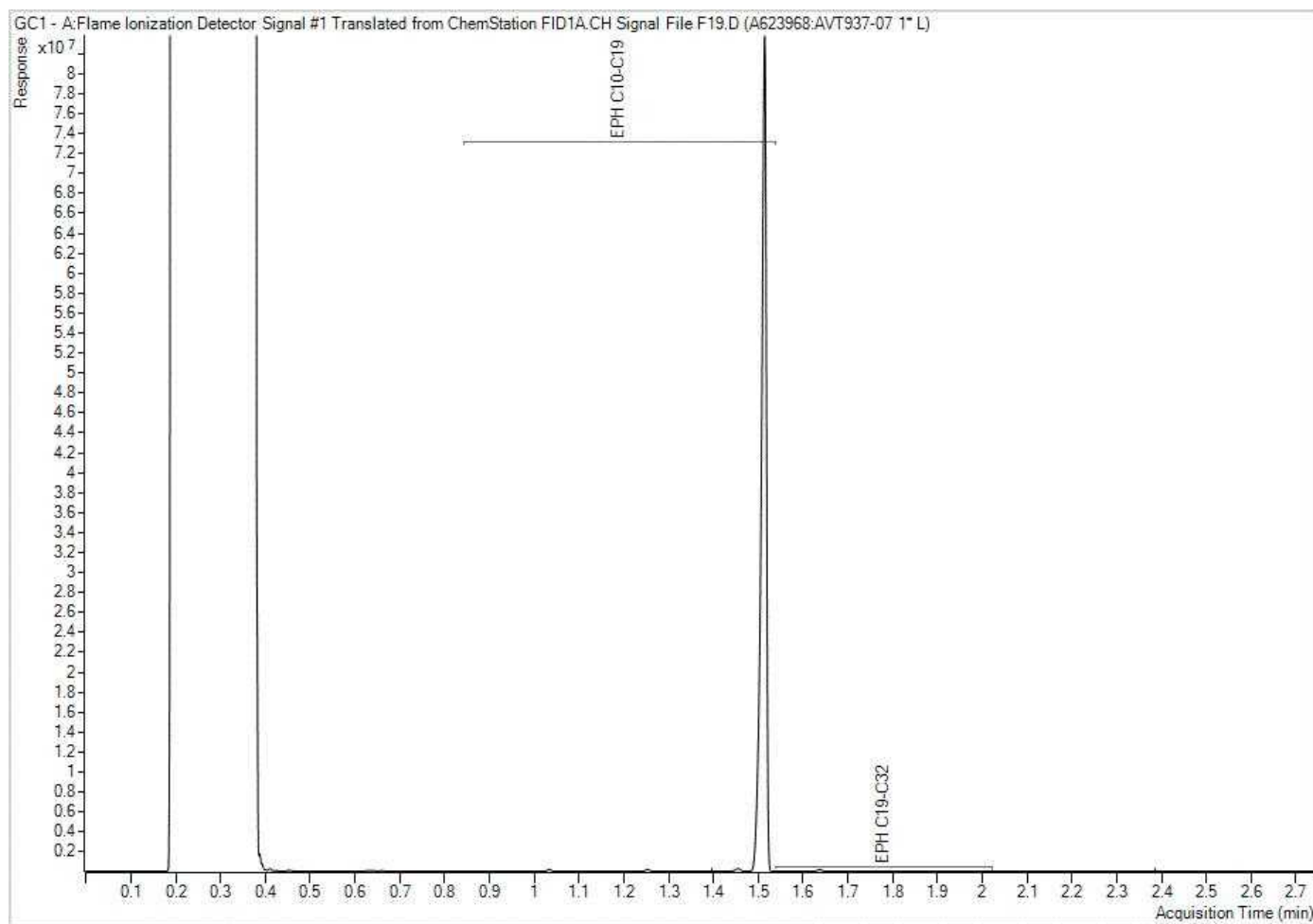
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



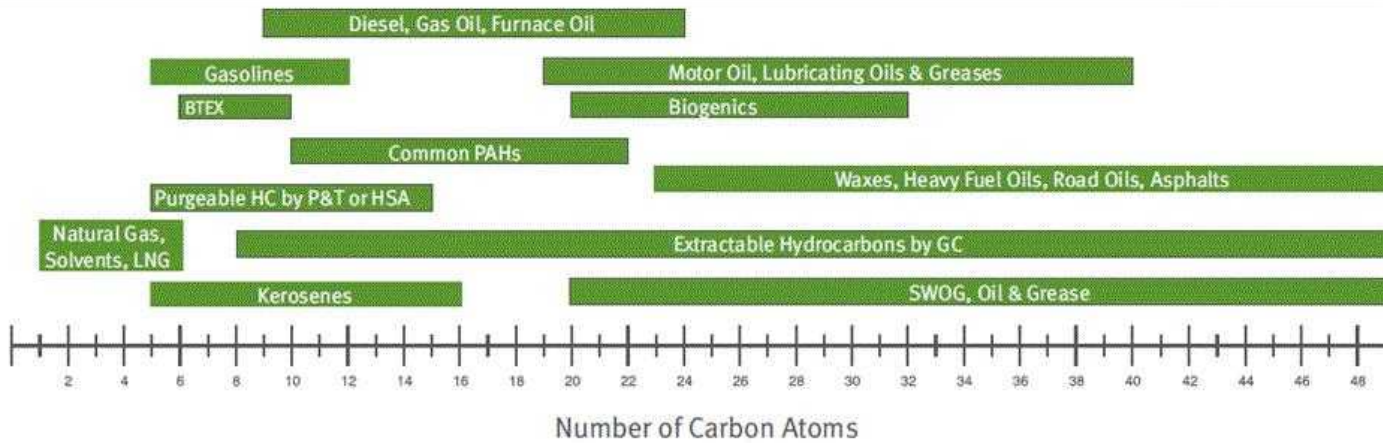
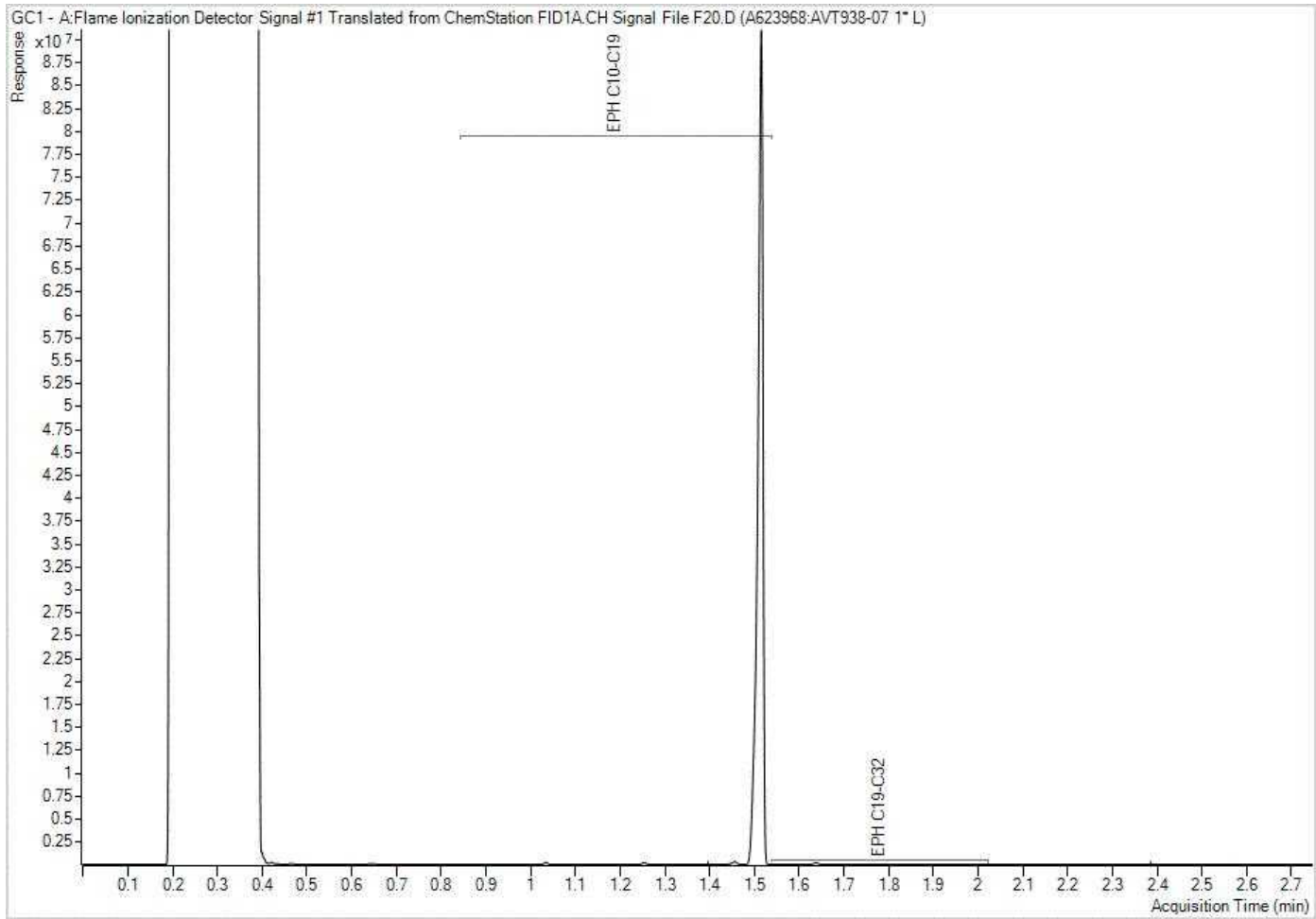
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



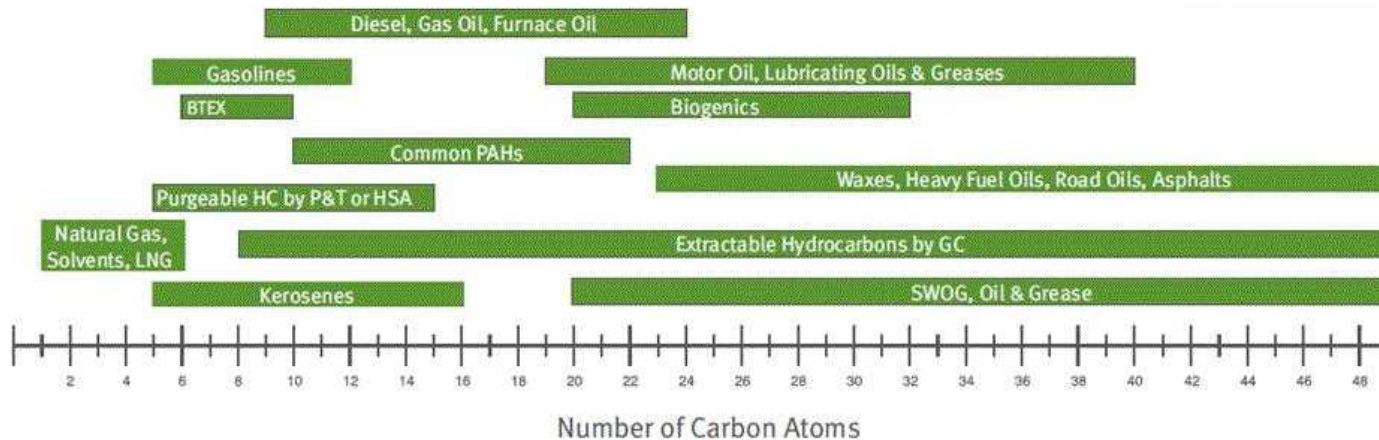
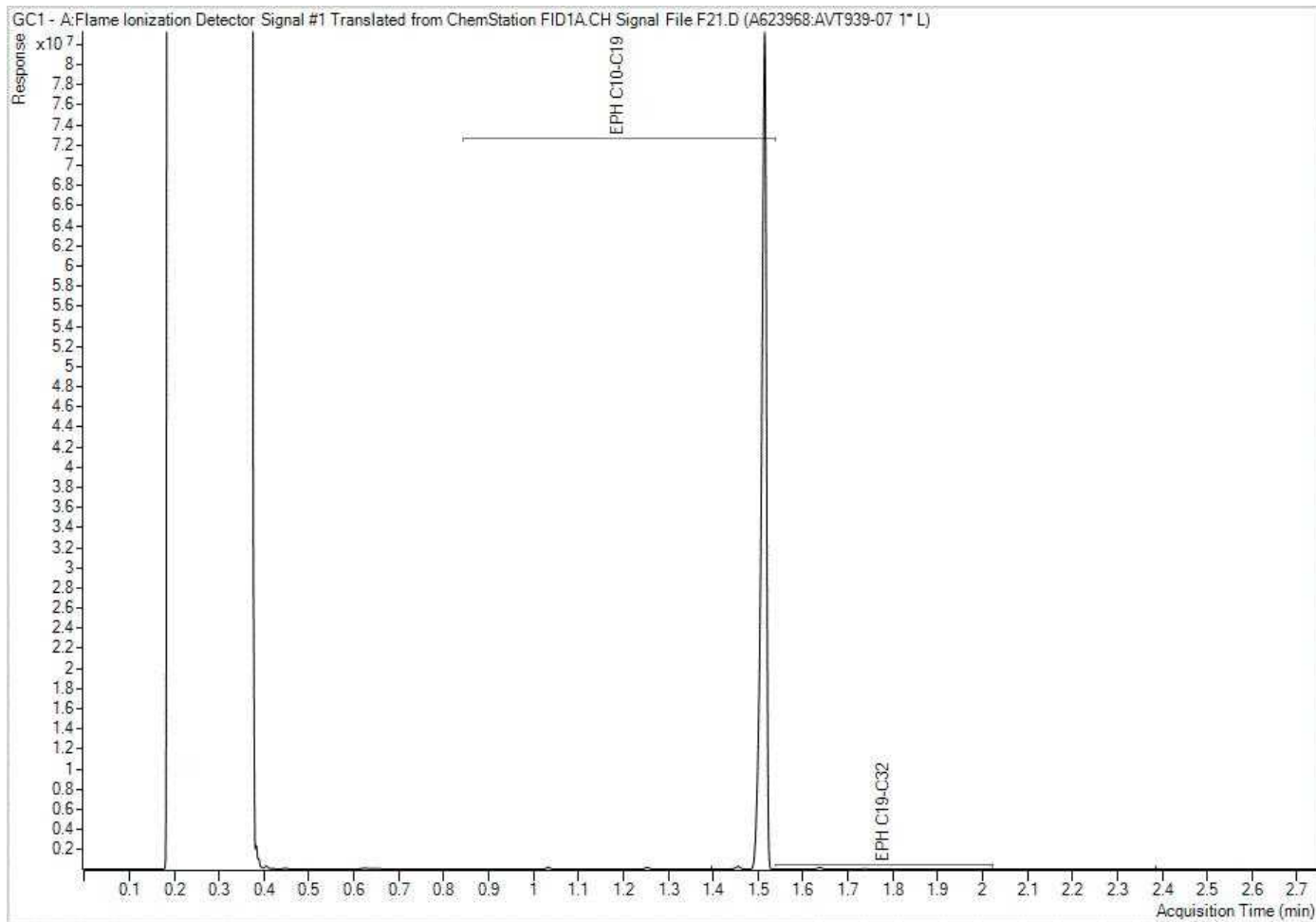
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



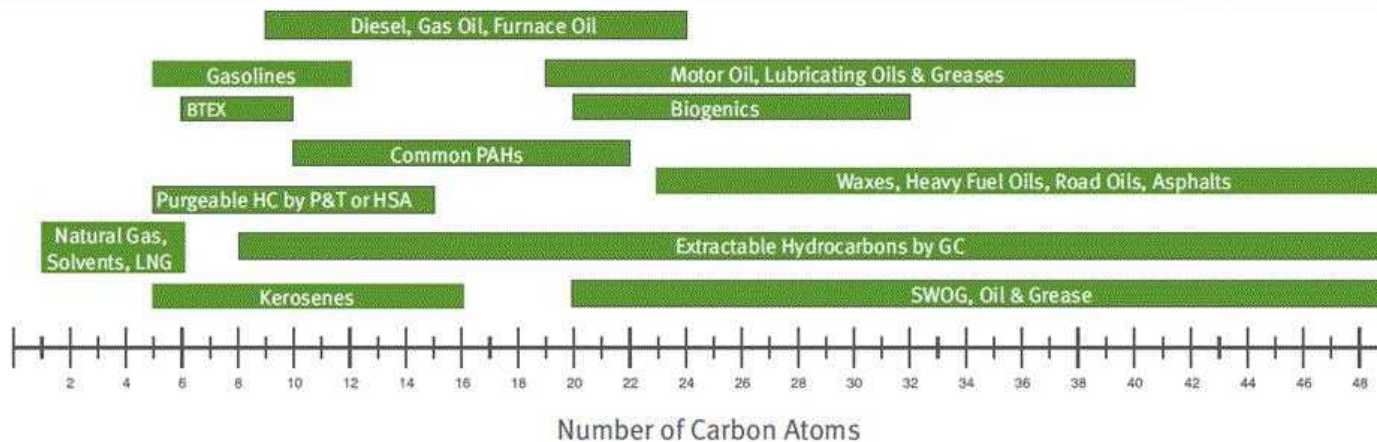
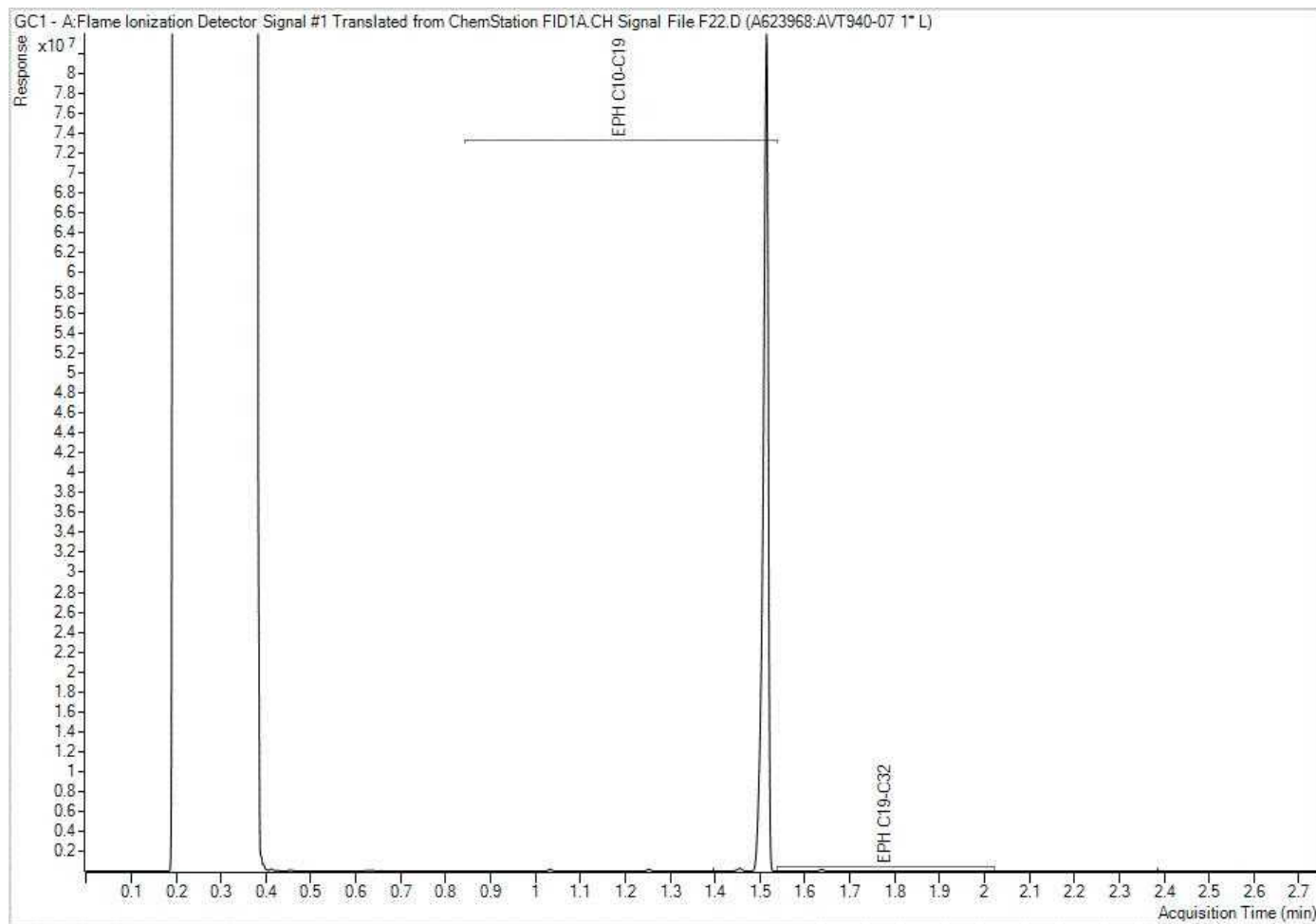
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



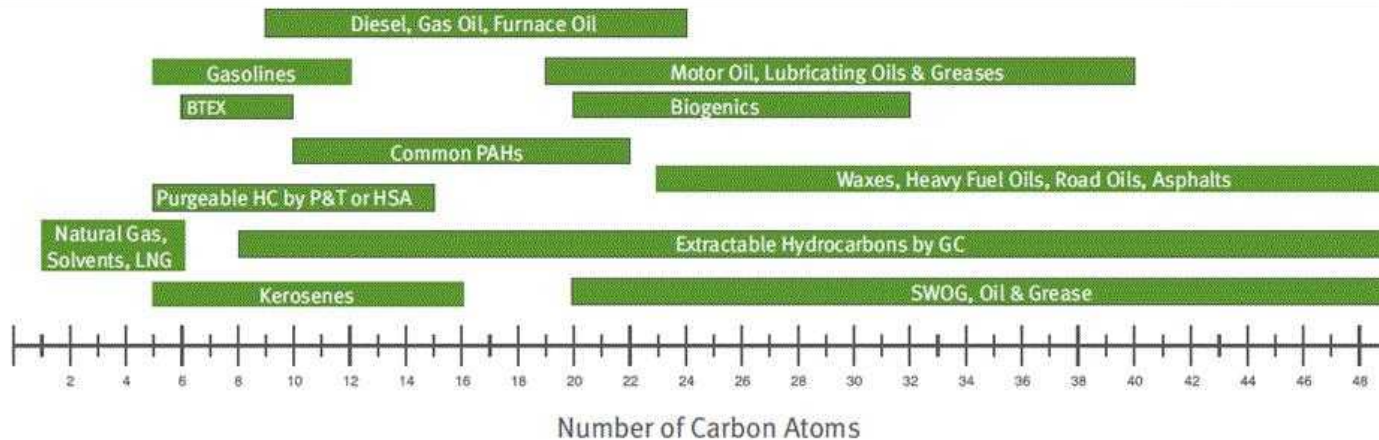
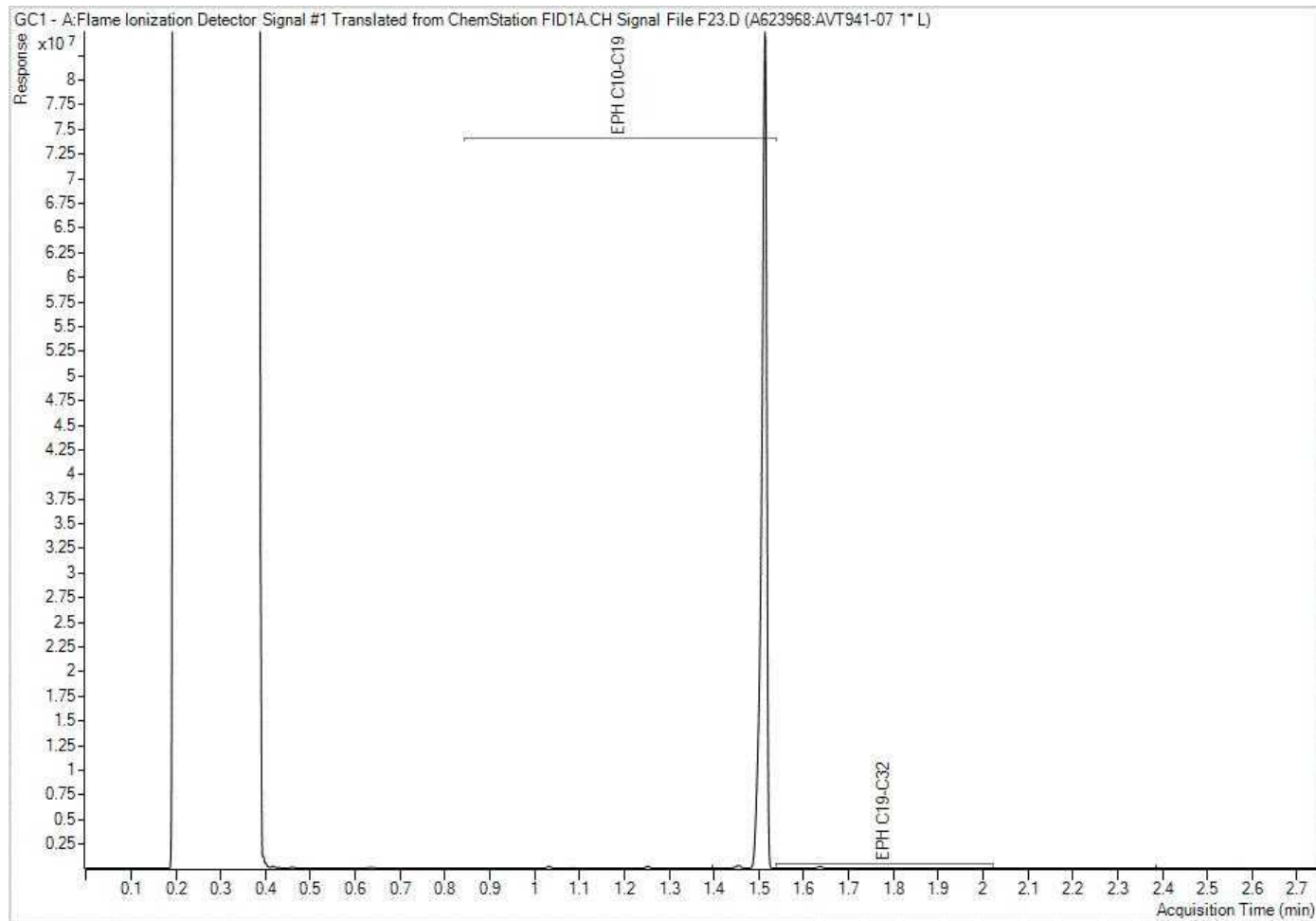
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640
Your Project #: 11222680
Site#: SURFACE WATER
Site Location: UPLAND EMP
Your C.O.C. #: 666639-02-01

Report Date: 2022/07/20

Report #: R3202829

Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT**BUREAU VERITAS JOB #: C244597****Received: 2022/06/24, 11:13**

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	2	N/A	2022/06/25	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	2	N/A	2022/06/27	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO ₄ -E m
Conductivity @25C	2	N/A	2022/06/25	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H ₂ S) (1)	1	N/A	2022/06/27		Auto Calc
Sulphide (as H ₂ S) (1)	1	N/A	2022/06/28		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc (1)	1	N/A	2022/06/27		
Un-ionized Hydrogen Sulphide as S Calc (1)	1	N/A	2022/06/28		
Hardness (calculated as CaCO ₃)	2	N/A	2022/06/29	BBY WI-00033	Auto Calc
Mercury (Total) by CV	2	2022/06/27	2022/06/27	AB SOP-00084	BCMOE BCLM Oct2013 m
ICP-OES Dissolved Metals in Water (2)	2	N/A	2022/06/28	BBY7SOP-00018	EPA 6010d m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	2022/06/24	2022/06/28	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	1	2022/06/25	2022/06/27	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Elements by CRC ICPMS (total)	1	2022/06/27	2022/06/27	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	2	N/A	2022/06/27	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate + Nitrite (N)	2	N/A	2022/06/25	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrite (N) by CFA	2	N/A	2022/06/25	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	2	N/A	2022/06/27	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	2	N/A	2022/06/24	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (3)	2	N/A	2022/06/25	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	1	N/A	2022/06/27	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Sulphide (1)	1	N/A	2022/06/28	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Dissolved Solids (Filt. Residue)	2	2022/06/29	2022/06/30	BBY6SOP-00033	SM 23 2540 C m
Total Suspended Solids (NFR)	2	2022/07/14	2022/07/15	BBY6SOP-00034	SM 23 2540 D m
Field pH	2	N/A	2022/06/24		
Field Temperature	2	N/A	2022/06/24		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.



Attention: Aïresse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640
Your Project #: 11222680
Site#: SURFACE WATER
Site Location: UPLAND EMP
Your C.O.C. #: 666639-02-01

Report Date: 2022/07/20

Report #: R3202829

Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C244597

Received: 2022/06/24, 11:13

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.

(3) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Thomas Pinchin, Project Solutions Representative

Email: Thomas.Pinchin@bureauveritas.com

Phone# (604) 734 7276

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU
VERITAS

Bureau Veritas Job #: C244597

Report Date: 2022/07/20

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		AVT932		AVT933	AVT933			
Sampling Date		2022/06/23 13:05		2022/06/23 13:40	2022/06/23 13:40			
COC Number		666639-02-01		666639-02-01	666639-02-01			
	UNITS	WS-11222680-230622- CXW-01	QC Batch	WS-11222680-230622- CXW-02	WS-11222680-230622- CXW-02 Lab-Dup	RDL	MDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.0050	A622849	<0.0050	N/A	0.0050	0.0050	A622849

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	N/A	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	14.7	A621389	22.2	N/A	0.50	0.50	A621389
Nitrate (N)	mg/L	<0.020	A621392	<0.020	N/A	0.020	N/A	A621392
Sulphide (as H2S)	mg/L	<0.0020	A621379	<0.0020	N/A	0.0020	N/A	A621379

Field Parameters

Field pH	pH	7.39	ONSITE	7.76	N/A	N/A	N/A	ONSITE
Field Temperature	°C	15.15	ONSITE	14.21	N/A	N/A	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	52	A624630	50	50	2.0	N/A	A624617
Total Dissolved Solids	mg/L	52	A627290	50	N/A	10	N/A	A627290
Total Suspended Solids	mg/L	<2.1 (1)	A644105	2.5 (1)	N/A	2.1	N/A	A644105

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	A624632	<1.0	<1.0	1.0	N/A	A624618
Alkalinity (Total as CaCO3)	mg/L	15	A624632	23	22	1.0	N/A	A624618
Bicarbonate (HCO3)	mg/L	18	A624632	28	27	1.0	N/A	A624618
Carbonate (CO3)	mg/L	<1.0	A624632	<1.0	<1.0	1.0	N/A	A624618
Hydroxide (OH)	mg/L	<1.0	A624632	<1.0	<1.0	1.0	N/A	A624618
Total Sulphide	mg/L	<0.0018 (2)	A624895	<0.0018	N/A	0.0018	N/A	A624257
Chloride (Cl)	mg/L	5.1	A624809	1.0	N/A	1.0	N/A	A624809
Sulphate (SO4)	mg/L	3.1	A624809	3.7	N/A	1.0	N/A	A624809

Nutrients

Total Ammonia (N)	mg/L	<0.015	A624284	<0.015	N/A	0.015	0.0040	A624284
Orthophosphate (P)	mg/L	<0.0030	A623046	<0.0030	N/A	0.0030	0.0030	A623046
Nitrate plus Nitrite (N)	mg/L	<0.020	A622848	<0.020	N/A	0.020	0.020	A622848

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) RDL raised due to limited initial sample amount.

(2) Matrix spike exceeds acceptance limits due to matrix interference.



BUREAU
VERITAS

Bureau Veritas Job #: C244597

Report Date: 2022/07/20

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		AVT932	AVT933			
Sampling Date		2022/06/23 13:05	2022/06/23 13:40			
COC Number		666639-02-01	666639-02-01			
	UNITS	WS-11222680-230622- CXW-01	WS-11222680-230622- CXW-02	RDL	MDL	QC Batch

Dissolved Metals by ICP						
Dissolved Calcium (Ca)	mg/L	4.22	7.59	0.050	0.050	A624166
Dissolved Magnesium (Mg)	mg/L	1.02	0.780	0.050	0.050	A624166
RDL = Reportable Detection Limit						



BUREAU
VERITAS

Bureau Veritas Job #: C244597

Report Date: 2022/07/20

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

MISCELLANEOUS (WATER)

Bureau Veritas ID		AVT932	AVT933			
Sampling Date		2022/06/23 13:05	2022/06/23 13:40			
COC Number		666639-02-01	666639-02-01			
	UNITS	WS-11222680-230622- CXW-01	WS-11222680-230622- CXW-02	RDL	MDL	QC Batch
Calculated Parameters						
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	0.0050	0.0050	A621967
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	<0.0050	0.0050	0.0050	A621967
RDL = Reportable Detection Limit						

BUREAU
VERITAS

Bureau Veritas Job #: C244597

Report Date: 2022/07/20

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT932		AVT933			
Sampling Date		2022/06/23 13:05		2022/06/23 13:40			
COC Number		666639-02-01		666639-02-01			
	UNITS	WS-11222680-230622- CXW-01	QC Batch	WS-11222680-230622- CXW-02	RDL	MDL	QC Batch
Elements							
Total Mercury (Hg)	ug/L	<0.0019	A624218	<0.0019	0.0019	0.0019	A624218
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	22.6	A622639	22.6	3.0	0.030	A623768
Total Antimony (Sb)	ug/L	<0.50	A622639	<0.50	0.50	0.0020	A623768
Total Arsenic (As)	ug/L	<0.10	A622639	0.13	0.10	0.010	A623768
Total Barium (Ba)	ug/L	2.1	A622639	2.7	1.0	0.0020	A623768
Total Beryllium (Be)	ug/L	<0.10	A622639	<0.10	0.10	0.0030	A623768
Total Bismuth (Bi)	ug/L	<1.0	A622639	<1.0	1.0	0.0010	A623768
Total Boron (B)	ug/L	<50	A622639	<50	50	50	A623768
Total Cadmium (Cd)	ug/L	<0.010	A622639	0.011	0.010	0.0020	A623768
Total Chromium (Cr)	ug/L	<1.0	A622639	<1.0	1.0	0.020	A623768
Total Cobalt (Co)	ug/L	<0.20	A622639	<0.20	0.20	0.20	A623768
Total Copper (Cu)	ug/L	0.62	A622639	0.57	0.50	0.030	A623768
Total Iron (Fe)	ug/L	43	A622639	16	10	0.70	A623768
Total Lead (Pb)	ug/L	<0.20	A622639	<0.20	0.20	0.0010	A623768
Total Lithium (Li)	ug/L	<2.0	A622639	<2.0	2.0	2.0	A623768
Total Manganese (Mn)	ug/L	5.0	A622639	2.2	1.0	0.030	A623768
Total Molybdenum (Mo)	ug/L	<1.0	A622639	<1.0	1.0	0.0020	A623768
Total Nickel (Ni)	ug/L	<1.0	A622639	<1.0	1.0	0.010	A623768
Total Phosphorus (P)	ug/L	<10	A622639	<10	10	1.0	A623768
Total Selenium (Se)	ug/L	<0.10	A622639	<0.10	0.10	0.0060	A623768
Total Silicon (Si)	ug/L	1520	A622639	1820	100	0.30	A623768
Total Silver (Ag)	ug/L	<0.020	A622639	<0.020	0.020	0.0020	A623768
Total Strontium (Sr)	ug/L	14.7	A622639	11.5	1.0	0.0020	A623768
Total Thallium (Tl)	ug/L	<0.010	A622639	<0.010	0.010	0.010	A623768
Total Tin (Sn)	ug/L	<5.0	A622639	<5.0	5.0	0.0050	A623768
Total Titanium (Ti)	ug/L	<5.0	A622639	<5.0	5.0	0.30	A623768
Total Uranium (U)	ug/L	<0.10	A622639	<0.10	0.10	0.0010	A623768
Total Vanadium (V)	ug/L	<5.0	A622639	<5.0	5.0	0.020	A623768
Total Zinc (Zn)	ug/L	<5.0	A622639	21.0	5.0	0.050	A623768
Total Zirconium (Zr)	ug/L	<0.10	A622639	<0.10	0.10	0.0080	A623768
RDL = Reportable Detection Limit							



**BUREAU
VERITAS**

Bureau Veritas Job #: C244597
Report Date: 2022/07/20

GHD Limited
Client Project #: 11222680
Site Location: UPLAND EMP
Your P.O. #: 735-002640
Sampler Initials: CXW

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		AVT932		AVT933			
Sampling Date		2022/06/23 13:05		2022/06/23 13:40			
COC Number		666639-02-01		666639-02-01			
	UNITS	WS-11222680-230622- CXW-01	QC Batch	WS-11222680-230622- CXW-02	RDL	MDL	QC Batch
Total Calcium (Ca)	mg/L	4.55	A621187	7.63	0.050	0.0010	A621187
Total Magnesium (Mg)	mg/L	1.06	A621187	0.823	0.050	0.00050	A621187
Total Potassium (K)	mg/L	0.141	A621187	0.082	0.050	0.0020	A621187
Total Sodium (Na)	mg/L	3.96	A621187	0.783	0.050	0.0010	A621187
Total Sulphur (S)	mg/L	<3.0	A621187	<3.0	3.0	1.0	A621187
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C244597

Report Date: 2022/07/20

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

GENERAL COMMENTS

Version 2: Report reissued to include results for TSS as per client request on 2022/07/14

Sample analyzed past hold time. Analysis performed with client's consent.

Sample AVT932 [WS-11222680-230622-CXW-01] : Sample was analyzed past method specified hold time for Total Suspended Solids (NFR). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample AVT933 [WS-11222680-230622-CXW-02] : Sample was analyzed past method specified hold time for Total Suspended Solids (NFR). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C244597

Report Date: 2022/07/20

QUALITY ASSURANCE REPORT

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A622639	Total Aluminum (Al)	2022/06/27	110	80 - 120	108	80 - 120	<3.0	ug/L	3.7 (1)	20
A622639	Total Antimony (Sb)	2022/06/27	111	80 - 120	106	80 - 120	<0.50	ug/L	NC (1)	20
A622639	Total Arsenic (As)	2022/06/27	110	80 - 120	110	80 - 120	<0.10	ug/L	0.94 (1)	20
A622639	Total Barium (Ba)	2022/06/27	107	80 - 120	105	80 - 120	<1.0	ug/L	3.2 (1)	20
A622639	Total Beryllium (Be)	2022/06/27	107	80 - 120	107	80 - 120	<0.10	ug/L	NC (1)	20
A622639	Total Bismuth (Bi)	2022/06/27	104	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
A622639	Total Boron (B)	2022/06/27	110	80 - 120	110	80 - 120	<50	ug/L	NC (1)	20
A622639	Total Cadmium (Cd)	2022/06/27	108	80 - 120	107	80 - 120	<0.010	ug/L	NC (1)	20
A622639	Total Chromium (Cr)	2022/06/27	108	80 - 120	107	80 - 120	<1.0	ug/L	3.6 (1)	20
A622639	Total Cobalt (Co)	2022/06/27	106	80 - 120	106	80 - 120	<0.20	ug/L	3.3 (1)	20
A622639	Total Copper (Cu)	2022/06/27	104	80 - 120	102	80 - 120	<0.50	ug/L	2.5 (1)	20
A622639	Total Iron (Fe)	2022/06/27	113	80 - 120	108	80 - 120	<10	ug/L	8.2 (1)	20
A622639	Total Lead (Pb)	2022/06/27	106	80 - 120	105	80 - 120	<0.20	ug/L	NC (1)	20
A622639	Total Lithium (Li)	2022/06/27	103	80 - 120	106	80 - 120	<2.0	ug/L	NC (1)	20
A622639	Total Manganese (Mn)	2022/06/27	107	80 - 120	106	80 - 120	<1.0	ug/L	4.5 (1)	20
A622639	Total Molybdenum (Mo)	2022/06/27	113	80 - 120	110	80 - 120	<1.0	ug/L	NC (1)	20
A622639	Total Nickel (Ni)	2022/06/27	106	80 - 120	104	80 - 120	<1.0	ug/L	0.83 (1)	20
A622639	Total Phosphorus (P)	2022/06/27	108	80 - 120	108	80 - 120	<10	ug/L		
A622639	Total Selenium (Se)	2022/06/27	110	80 - 120	107	80 - 120	<0.10	ug/L	NC (1)	20
A622639	Total Silicon (Si)	2022/06/27	113	80 - 120	114	80 - 120	<100	ug/L	NC (1)	20
A622639	Total Silver (Ag)	2022/06/27	106	80 - 120	102	80 - 120	<0.020	ug/L	1.4 (1)	20
A622639	Total Strontium (Sr)	2022/06/27	108	80 - 120	107	80 - 120	<1.0	ug/L	5.2 (1)	20
A622639	Total Thallium (Tl)	2022/06/27	106	80 - 120	106	80 - 120	<0.010	ug/L	NC (1)	20
A622639	Total Tin (Sn)	2022/06/27	106	80 - 120	104	80 - 120	<5.0	ug/L	NC (1)	20
A622639	Total Titanium (Ti)	2022/06/27	110	80 - 120	106	80 - 120	<5.0	ug/L	NC (1)	20
A622639	Total Uranium (U)	2022/06/27	109	80 - 120	109	80 - 120	<0.10	ug/L	NC (1)	20
A622639	Total Vanadium (V)	2022/06/27	107	80 - 120	106	80 - 120	<5.0	ug/L	NC (1)	20
A622639	Total Zinc (Zn)	2022/06/27	NC	80 - 120	106	80 - 120	<5.0	ug/L	3.5 (1)	20
A622639	Total Zirconium (Zr)	2022/06/27	108	80 - 120	107	80 - 120	<0.10	ug/L	NC (1)	20
A622848	Nitrate plus Nitrite (N)	2022/06/25	105	80 - 120	103	80 - 120	<0.020	mg/L	NC (1)	25
A622849	Nitrite (N)	2022/06/25	103	80 - 120	101	80 - 120	<0.0050	mg/L	NC (1)	20



**BUREAU
VERITAS**

Bureau Veritas Job #: C244597

Report Date: 2022/07/20

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A623046	Orthophosphate (P)	2022/06/25	76	80 - 120	94	80 - 120	<0.0030	mg/L	1.1 (1)	20
A623768	Total Aluminum (Al)	2022/06/27	NC	80 - 120	105	80 - 120	<3.0	ug/L		
A623768	Total Antimony (Sb)	2022/06/27	105	80 - 120	102	80 - 120	<0.50	ug/L		
A623768	Total Arsenic (As)	2022/06/27	111	80 - 120	105	80 - 120	<0.10	ug/L		
A623768	Total Barium (Ba)	2022/06/27	102	80 - 120	99	80 - 120	<1.0	ug/L		
A623768	Total Beryllium (Be)	2022/06/27	103	80 - 120	104	80 - 120	<0.10	ug/L		
A623768	Total Bismuth (Bi)	2022/06/27	93	80 - 120	99	80 - 120	<1.0	ug/L		
A623768	Total Boron (B)	2022/06/27	NC	80 - 120	107	80 - 120	<50	ug/L		
A623768	Total Cadmium (Cd)	2022/06/27	101	80 - 120	102	80 - 120	<0.010	ug/L		
A623768	Total Chromium (Cr)	2022/06/27	99	80 - 120	102	80 - 120	<1.0	ug/L		
A623768	Total Cobalt (Co)	2022/06/27	96	80 - 120	101	80 - 120	<0.20	ug/L		
A623768	Total Copper (Cu)	2022/06/27	90	80 - 120	98	80 - 120	<0.50	ug/L	NC (1)	20
A623768	Total Iron (Fe)	2022/06/27	97	80 - 120	103	80 - 120	<10	ug/L		
A623768	Total Lead (Pb)	2022/06/27	99	80 - 120	102	80 - 120	<0.20	ug/L		
A623768	Total Lithium (Li)	2022/06/27	NC	80 - 120	102	80 - 120	<2.0	ug/L		
A623768	Total Manganese (Mn)	2022/06/27	NC	80 - 120	102	80 - 120	<1.0	ug/L		
A623768	Total Molybdenum (Mo)	2022/06/27	NC	80 - 120	103	80 - 120	<1.0	ug/L		
A623768	Total Nickel (Ni)	2022/06/27	93	80 - 120	101	80 - 120	<1.0	ug/L		
A623768	Total Phosphorus (P)	2022/06/27	108	80 - 120	104	80 - 120	<10	ug/L		
A623768	Total Selenium (Se)	2022/06/27	102	80 - 120	102	80 - 120	<0.10	ug/L		
A623768	Total Silicon (Si)	2022/06/27	NC	80 - 120	110	80 - 120	<100	ug/L		
A623768	Total Silver (Ag)	2022/06/27	100	80 - 120	99	80 - 120	<0.020	ug/L		
A623768	Total Strontium (Sr)	2022/06/27	NC	80 - 120	103	80 - 120	<1.0	ug/L		
A623768	Total Thallium (Tl)	2022/06/27	98	80 - 120	100	80 - 120	<0.010	ug/L		
A623768	Total Tin (Sn)	2022/06/27	109	80 - 120	99	80 - 120	<5.0	ug/L		
A623768	Total Titanium (Ti)	2022/06/27	107	80 - 120	104	80 - 120	<5.0	ug/L		
A623768	Total Uranium (U)	2022/06/27	107	80 - 120	104	80 - 120	<0.10	ug/L		
A623768	Total Vanadium (V)	2022/06/27	104	80 - 120	101	80 - 120	<5.0	ug/L		
A623768	Total Zinc (Zn)	2022/06/27	95	80 - 120	102	80 - 120	<5.0	ug/L		
A623768	Total Zirconium (Zr)	2022/06/27	111	80 - 120	101	80 - 120	<0.10	ug/L		
A624166	Dissolved Calcium (Ca)	2022/06/29	NC	80 - 120	100	80 - 120	<0.050	mg/L		



BUREAU
VERITAS

Bureau Veritas Job #: C244597

Report Date: 2022/07/20

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A624166	Dissolved Magnesium (Mg)	2022/06/29	NC	80 - 120	99	80 - 120	<0.050	mg/L		
A624218	Total Mercury (Hg)	2022/06/27	81	80 - 120	88	80 - 120	<0.0019	ug/L	NC (1)	20
A624257	Total Sulphide	2022/06/27	112	80 - 120	119	80 - 120	<0.0018	mg/L	NC (1)	20
A624284	Total Ammonia (N)	2022/06/27	NC	80 - 120	106	80 - 120	<0.015	mg/L	0.45 (1)	20
A624617	Conductivity	2022/06/25			100	80 - 120	<2.0	uS/cm	0 (2)	10
A624618	Alkalinity (PP as CaCO ₃)	2022/06/25					<1.0	mg/L	NC (2)	20
A624618	Alkalinity (Total as CaCO ₃)	2022/06/25	97 (3)	80 - 120	98	80 - 120	<1.0	mg/L	1.5 (2)	20
A624618	Bicarbonate (HCO ₃)	2022/06/25					<1.0	mg/L	1.5 (2)	20
A624618	Carbonate (CO ₃)	2022/06/25					<1.0	mg/L	NC (2)	20
A624618	Hydroxide (OH)	2022/06/25					<1.0	mg/L	NC (2)	20
A624630	Conductivity	2022/06/25			101	80 - 120	<2.0	uS/cm	0 (1)	10
A624632	Alkalinity (PP as CaCO ₃)	2022/06/25					<1.0	mg/L	NC (1)	20
A624632	Alkalinity (Total as CaCO ₃)	2022/06/25	NC	80 - 120	99	80 - 120	<1.0	mg/L	0.25 (1)	20
A624632	Bicarbonate (HCO ₃)	2022/06/25					<1.0	mg/L	0.25 (1)	20
A624632	Carbonate (CO ₃)	2022/06/25					<1.0	mg/L	NC (1)	20
A624632	Hydroxide (OH)	2022/06/25					<1.0	mg/L	NC (1)	20
A624809	Chloride (Cl)	2022/06/27	NC	80 - 120	99	80 - 120	<1.0	mg/L	0.10 (1)	20
A624809	Sulphate (SO ₄)	2022/06/27	NC	80 - 120	103	80 - 120	<1.0	mg/L	0.13 (1)	20
A624895	Total Sulphide	2022/06/28	128 (4,5)	80 - 120	114	80 - 120	<0.0018	mg/L	NC (1)	20
A627290	Total Dissolved Solids	2022/06/30	100	80 - 120	102	80 - 120	<10	mg/L	3.2 (1)	20



BUREAU
VERITAS

Bureau Veritas Job #: C244597

Report Date: 2022/07/20

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A644105	Total Suspended Solids	2022/07/15	101	80 - 120	103	80 - 120	<1.0	mg/L	NC (1)	20
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement. Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference. Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy. Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination. NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration) NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$). (1) Duplicate Parent ID (2) Duplicate Parent ID [AVT933-01] (3) Matrix Spike Parent ID [AVT933-01] (4) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria. (5) Matrix Spike Parent ID [AVT932-05]										



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Bureau Veritas Job #: C244597

Report Date: 2022/07/20

GHD Limited

Client Project #: 11222680

Site Location: UPLAND EMP

Your P.O. #: 735-002640

Sampler Initials: CXW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager



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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Bureau Veritas
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Page 1 of 1

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name	GHD Ltd.	Quotation #	C10010
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #	735-002640
Address	455 PHILLIP STREET WATERLOO ON N2L 3X2	Address	Suite 100 - 138 E. 7th Ave. Vancouver BC V5T 1M6	Project #	11222680
Phone	(519) 884-0510	Phone	604 248 3661	Project Name	Upland EMP
Email	APInvoices-735@ghd.com	Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Site #	Surface Water
				Sampled By	CXN

Barcode: C244597_COC

Bottle Order #: 666639

Chain Of Custody Record

Project Manager: Thomas Pinchin

☒ CSR	Special Instructions Field Filtered & preserved as needed SHORT HOLD TIMES In cooler w/ other COC (2 samples)	ANALYSIS REQUESTED (PLEASE BE SPECIFIC)	Metals Field Filtered ? (Y/N)	Conductivity, Cl, SO4, NO2, NO3, N+N, PO4	Specialized Alkalinity	Sulphide + H2S Calc	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Total Dissolved Solids (Filt. Residue)	Total Metals with CV Hg	Dissolved Hardness	Field pH	Field Temperature	Turnaround Time (TAT) Required:	
☐ CCME														Please provide advance notice for rush projects	
☐ BC Water Quality														Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests.	
☐ Other														Job Specific Rush TAT (if applies to entire submission) 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐	

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y/N)	Conductivity, Cl, SO4, NO2, NO3, N+N, PO4	Specialized Alkalinity	Sulphide + H2S Calc	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Total Dissolved Solids (Filt. Residue)	Total Metals with CV Hg	Dissolved Hardness	Field pH	Field Temperature	# of Bottles	Comments
WS-11222680-230622-CXW-01	June 23, 22	1305	Surface Water	Y	X	X	X	X	X	X	X	X	X	7.39	15.15	7	
WS-11222680-230622-CXW-02	↓	1340	↓	Y	X	X	X	X	X	X	X	X	X	7.76	14.21	7	

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only		
CARNEY WING	22/06/24	1105	JASITS TAYLOR WHITEHOUSE	22/06/24	11:13		Time Sensitive ☐	Temperature (°C) on Receipt: 2, 3, 2	Custody Seal Intact on Cooler? ☒ Yes ☐ No
							White: Bureau Veritas Yellow: Client		

UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS.

IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Location	Date Time	Sample Name	Matrix	Type	Sampler	Site Name	Facility ID	Field pH (L.u.)	Conductivity	Conductivity Unit	Sample Temperature	Sample Temperature Unit	Turbidity (NTU)	ORP	ORP Units	Dissolved Oxygen (DO)	DO Units	Volume of Water Purged	Volume Purged Units	Flow Rate Units	Event Name	Sampling Company	Sample Observation
MW13-19	09/07/2022 12:20:00	WG-11222680-070922-CXW-01	WG	N	Carry	Upland Landfill	1088877000	7.20	560	uS/cm	14.47	deg C	806	176	millivolt	9.75	mg/L	2	L	mL/min	202208-Q3WVG	GHD	Turbid, well does not go clear; no odour
MW10-17	09/07/2022 13:16:00	WG-11222680-070922-CXW-02	WG	N	Carry	Upland Landfill	1088877000	7.50	415	uS/cm	12.78	deg C	4.4	132	millivolt	12.00	mg/L	2	L	mL/min	202208-Q3WVG	GHD	Clear, no odour
MW12-22	09/07/2022 14:00:00	WG-11222680-070922-CXW-03	WG	N	Carry	Upland Landfill	1088877000	7.35	311	uS/cm	10.80	deg C	17.8	158	millivolt	16.09	mg/L	1	L	mL/min	202208-Q3WVG	GHD	Clear, no odour
MW4B-15	09/07/2022 15:16:00	WG-11222680-070922-CXW-04	WG	N	Carry	Upland Landfill	1088877000	7.07	238	uS/cm	10.36	deg C	6.0	171	millivolt	7.69	mg/L	10	L	mL/min	202208-Q3WVG	GHD	Clear, no odour
MW4B-15	09/07/2022 15:41:00	WG-11222680-070922-CXW-05	WG	N	Carry	Upland Landfill	1088877000	6.97	232	uS/cm	10.01	deg C	5.7	185	millivolt	8.46	mg/L	5	L	mL/min	202208-Q3WVG	GHD	Clear, no odour
MW1-14	09/07/2022 16:25:00	WG-11222680-070922-CXW-06	WG	N	Carry	Upland Landfill	1088877000	7.29	120	uS/cm	10.90	deg C	16.0	181	millivolt	13.95	mg/L	3	L	mL/min	202208-Q3WVG	GHD	Clear, no odour
MW6-17	09/07/2022 16:45:00	WG-11222680-070922-CXW-07	WG	N	Carry	Upland Landfill	1088877000	6.96	476	uS/cm	11.77	deg C	285	183	millivolt	5.13	mg/L	13	L	mL/min	202208-Q3WVG	GHD	Slightly turbid, no odour
East Surface Water Ditch	09/07/2022 14:20:00			N	Carry	Upland Landfill	1088877000																Dry, no sample
West Surface Water Ditch	09/07/2022 14:25:00			N	Carry	Upland Landfill	1088877000																Dry, no sample
TUP	09/07/2022 14:25:00			N	Carry	Upland Landfill	1088877000																Dry, no sample
Rico Gauge	09/07/2022 16:30:00			N	Carry	Upland Landfill	1088877000																Water below surface water gauge, see photos in field folder
Mchor Lake	09/07/2022 19:15:00			N	Carry	Upland Landfill	1088877000																Information taken off website on September 7, 2022
MW9-17	09/08/2022 08:16:00	WG-11222680-080922-CXW-08	WG	N	Carry	Upland Landfill	1088877000	6.79	73	uS/cm	9.30	deg C	3.5	252	millivolt	5.82	mg/L	10	L	mL/min	202208-Q3WVG	GHD	Clear, no odour
MW2A-16	09/08/2022 09:20:00	WG-11222680-080922-CXW-09	WG	N	Carry	Upland Landfill	1088877000	7.45	87	uS/cm	10.22	deg C	1.5	234	millivolt	5.23	mg/L	5	L	mL/min	202208-Q3WVG	GHD	Clear, no odour
MW2-14	09/08/2022 09:45:00	WG-11222680-080922-CXW-10	WG	N	Carry	Upland Landfill	1088877000	7.17	130	uS/cm	9.99	deg C	10.6	224	millivolt	8.32	mg/L	5	L	mL/min	202208-Q3WVG	GHD	Clear, no odour
LDS	09/08/2022 09:15:00	WL-11222680-080922-CXW-01	WW	N	Carry	Upland Landfill	1088877000	6.82	411	uS/cm	17.08	deg C	77.3	197	millivolt	3.78	mg/L		L	mL/min	202208-Q3WVG	GHD	Slightly turbid, minor odour
S06-21	09/08/2022 11:21:00	WL-11222680-080922-CXW-02	WW	N	Carry	Upland Landfill	1088877000	7.19	409	uS/cm	19.30	deg C	101	-31	millivolt	1.88	mg/L		L	mL/min	202208-Q3WVG	GHD	Black colour, strong odour, black particles in water
S06-21	09/08/2022 11:30:00	WL-11222680-080922-CXW-03	WW	FO	Carry	Upland Landfill	1088877000	7.19	409	uS/cm	19.30	deg C	101	-31	millivolt	1.88	mg/L		L	mL/min	202208-Q3WVG	GHD	Field blank with 12 water
Field Blank	09/08/2022 12:00:00	WG-11222680-080922-CXW-11	WQ	FB	Carry	Upland Landfill	1088877000																Dry at 11.113 mBTOP
LDMP-1	09/08/2022 07:00:00				Carry	Upland Landfill	1088877000																Dry at 12.627 mBTOP
LDMP-2	09/08/2022 07:00:00				Carry	Upland Landfill	1088877000																Dry at 12.627 mBTOP
LDMP-3	09/08/2022 07:00:00				Carry	Upland Landfill	1088877000																Dry at 12.627 mBTOP
LDMP-4	09/08/2022 07:00:00				Carry	Upland Landfill	1088877000																Obstruction at approx 0.9 mBTOP, could not get reading

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640-1
Your Project #: 11222680-15.1
Site#: GROUNDWATER
Site Location: NEW LANDFILL
Your C.O.C. #: 671453-01-01, 671453-02-01

Report Date: 2022/09/19

Report #: R3234316

Version: 1 - Final

CERTIFICATE OF ANALYSIS**BUREAU VERITAS JOB #: C268908****Received: 2022/09/09, 10:30**

Sample Matrix: Ground Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	11	N/A	2022/09/13	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	11	N/A	2022/09/12	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO ₄ -E m
Conductivity @25C	11	N/A	2022/09/13	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H ₂ S) (1)	11	N/A	2022/09/14		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	11	N/A	2022/09/14	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	11	N/A	2022/09/13	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (2)	11	2022/09/12	2022/09/12	AB SOP-00084	BCMOE BCLM Oct2013 m
EPH in Water when PAH required	11	2022/09/13	2022/09/13	BBY8SOP-00029	BCMOE BCLM Sep2017 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	11	N/A	2022/09/13	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (2)	3	N/A	2022/09/12	BBY7SOP-00002	EPA 6020b R2 m
Elements by CRC ICPMS (dissolved) (2)	8	N/A	2022/09/13	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	11	N/A	2022/09/12	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate + Nitrite (N)	11	N/A	2022/09/10	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrite (N) by CFA	11	N/A	2022/09/10	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	11	N/A	2022/09/12	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	11	2022/09/13	2022/09/14	BBY8SOP-00021	BCMOE BCLM Jul2017m
Filter and HNO ₃ Preserve for Metals	11	N/A	2022/09/09	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (3)	11	N/A	2022/09/10	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	11	N/A	2022/09/14	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Dissolved Solids (Filt. Residue)	6	2022/09/13	2022/09/14	BBY6SOP-00033	SM 23 2540 C m
Total Dissolved Solids (Filt. Residue)	5	2022/09/14	2022/09/15	BBY6SOP-00033	SM 23 2540 C m
EPH less PAH in Water by GC/FID (4)	11	N/A	2022/09/15	BBY WI-00033	Auto Calc
Field pH	11	N/A	2022/09/09		
Field Temperature	11	N/A	2022/09/09		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are



Attention: Aïresse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640-1
Your Project #: 11222680-15.1
Site#: GROUNDWATER
Site Location: NEW LANDFILL
Your C.O.C. #: 671453-01-01, 671453-02-01

Report Date: 2022/09/19
Report #: R3234316
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C268908

Received: 2022/09/09, 10:30

reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.

(3) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

(4) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Thomas Pinchin, Customer Solutions Representative

Email: Thomas.Pinchin@bureauveritas.com

Phone# (604) 734 7276

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		BBM875		BBM876			
Sampling Date		2022/09/07 12:20		2022/09/07 13:16			
COC Number		671453-01-01		671453-01-01			
	UNITS	WG-11222680-070922 -CXW-01	RDL	WG-11222680-070922 -CXW-02	RDL	MDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	0.0050	<0.0050	0.0050	0.0050	A711114
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	1.66	0.020	1.26	0.020	N/A	A709815
Sulphide (as H2S)	mg/L	<0.0020	0.0020	<0.0020	0.0020	N/A	A710488
Field Parameters							
Field pH	pH	7.20	N/A	7.50	N/A	N/A	ONSITE
Field Temperature	°C	14.47	N/A	12.78	N/A	N/A	ONSITE
Misc. Inorganics							
Conductivity	uS/cm	570	2.0	440	2.0	N/A	A713199
Total Dissolved Solids	mg/L	3000 (1)	13	330	10	N/A	A714216
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	<1.0	1.0	N/A	A713198
Alkalinity (Total as CaCO3)	mg/L	290	1.0	23	1.0	N/A	A713198
Bicarbonate (HCO3)	mg/L	350	1.0	28	1.0	N/A	A713198
Carbonate (CO3)	mg/L	<1.0	1.0	<1.0	1.0	N/A	A713198
Hydroxide (OH)	mg/L	<1.0	1.0	<1.0	1.0	N/A	A713198
Total Sulphide	mg/L	<0.0018	0.0018	<0.0018	0.0018	N/A	A714873
Chloride (Cl)	mg/L	3.7	1.0	32	1.0	N/A	A712647
Sulphate (SO4)	mg/L	6.5	1.0	130	5.0	N/A	A712647
Nutrients							
Total Ammonia (N)	mg/L	<0.015	0.015	<0.015	0.015	0.0040	A712955
Orthophosphate (P)	mg/L	0.013	0.0030	0.0059	0.0030	0.0030	A711120
Nitrate plus Nitrite (N)	mg/L	1.66	0.020	1.26	0.020	0.020	A711113
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) RDL raised due to high concentration of solids in the sample.							



BUREAU
VERITAS

Bureau Veritas Job #: C268908
Report Date: 2022/09/19

GHD Limited
Client Project #: 11222680-15.1
Site Location: NEW LANDFILL
Your P.O. #: 735-002640-1
Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		BBM877			BBM878			
Sampling Date		2022/09/07 14:00			2022/09/07 15:16			
COC Number		671453-01-01			671453-01-01			
	UNITS	WG-11222680-070922 -CXW-03	RDL	MDL	WG-11222680-070922 -CXW-04	RDL	MDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.0050	0.0050	0.0050	<0.0050	0.0050	0.0050	A711114
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.480	0.020	N/A	2.21	0.040	N/A	A709815
Sulphide (as H2S)	mg/L	<0.0020	0.0020	N/A	<0.0020	0.0020	N/A	A710488
Field Parameters								
Field pH	pH	7.35	N/A	N/A	7.07	N/A	N/A	ONSITE
Field Temperature	°C	10.80	N/A	N/A	10.38	N/A	N/A	ONSITE
Misc. Inorganics								
Conductivity	uS/cm	300	2.0	N/A	240	2.0	N/A	A713199
Total Dissolved Solids	mg/L	200	10	N/A	150	10	N/A	A714216
Anions								
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	<1.0	1.0	N/A	A713198
Alkalinity (Total as CaCO3)	mg/L	140	1.0	N/A	73	1.0	N/A	A713198
Bicarbonate (HCO3)	mg/L	180	1.0	N/A	89	1.0	N/A	A713198
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	<1.0	1.0	N/A	A713198
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	<1.0	1.0	N/A	A713198
Total Sulphide	mg/L	<0.0018	0.0018	N/A	<0.0018	0.0018	N/A	A714873
Chloride (Cl)	mg/L	2.1	1.0	N/A	13	1.0	N/A	A712370
Sulphate (SO4)	mg/L	6.0	1.0	N/A	14	1.0	N/A	A712370
Nutrients								
Total Ammonia (N)	mg/L	<0.015	0.015	0.0040	<0.015	0.015	0.0040	A712955
Orthophosphate (P)	mg/L	0.0053	0.0030	0.0030	0.0096	0.0030	0.0030	A711120
Nitrate plus Nitrite (N)	mg/L	0.480	0.020	0.020	2.21	0.040	0.040	A711113
RDL = Reportable Detection Limit								
N/A = Not Applicable								



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		BBM879			BBM880			
Sampling Date		2022/09/07 15:41			2022/09/07 16:25			
COC Number		671453-01-01			671453-01-01			
	UNITS	WG-11222680-070922 -CXW-05	RDL	MDL	WG-11222680-070922 -CXW-06	RDL	MDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.0050	0.0050	0.0050	<0.0050	0.0050	0.0050	A711114
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	2.24	0.040	N/A	0.141	0.020	N/A	A709815
Sulphide (as H2S)	mg/L	<0.0020	0.0020	N/A	<0.0020	0.0020	N/A	A710488
Field Parameters								
Field pH	pH	6.97	N/A	N/A	7.29	N/A	N/A	ONSITE
Field Temperature	°C	10.01	N/A	N/A	10.90	N/A	N/A	ONSITE
Misc. Inorganics								
Conductivity	uS/cm	240	2.0	N/A	120	2.0	N/A	A713203
Total Dissolved Solids	mg/L	150	10	N/A	96	10	N/A	A714216
Anions								
Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	N/A	<1.0	1.0	N/A	A713202
Alkalinity (Total as CaCO3)	mg/L	71	1.0	N/A	43	1.0	N/A	A713202
Bicarbonate (HCO3)	mg/L	87	1.0	N/A	53	1.0	N/A	A713202
Carbonate (CO3)	mg/L	<1.0	1.0	N/A	<1.0	1.0	N/A	A713202
Hydroxide (OH)	mg/L	<1.0	1.0	N/A	<1.0	1.0	N/A	A713202
Total Sulphide	mg/L	<0.0018	0.0018	N/A	<0.0018	0.0018	N/A	A714873
Chloride (Cl)	mg/L	13	1.0	N/A	7.8	1.0	N/A	A712370
Sulphate (SO4)	mg/L	14	1.0	N/A	2.9	1.0	N/A	A712370
Nutrients								
Total Ammonia (N)	mg/L	<0.015	0.015	0.0040	<0.015	0.015	0.0040	A712955
Orthophosphate (P)	mg/L	0.0095	0.0030	0.0030	0.0056	0.0030	0.0030	A711120
Nitrate plus Nitrite (N)	mg/L	2.24	0.040	0.040	0.141	0.020	0.020	A711113
RDL = Reportable Detection Limit								
N/A = Not Applicable								



BUREAU
VERITAS

Bureau Veritas Job #: C268908
Report Date: 2022/09/19

GHD Limited
Client Project #: 11222680-15.1
Site Location: NEW LANDFILL
Your P.O. #: 735-002640-1
Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		BBM881		BBM882	BBM882			
Sampling Date		2022/09/07 16:45		2022/09/08 08:16	2022/09/08 08:16			
COC Number		671453-01-01		671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-07	QC Batch	WG-11222680-080922 -CXW-08	WG-11222680-080922 -CXW-08 Lab-Dup	RDL	MDL	QC Batch

ANIONS

Nitrite (N)	mg/L	0.0409	A711116	<0.0050	N/A	0.0050	0.0050	A711116

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.714	A709815	0.069	N/A	0.020	N/A	A709815
Sulphide (as H2S)	mg/L	0.0024	A710488	<0.0020	N/A	0.0020	N/A	A710488

Field Parameters

Field pH	pH	6.96	ONSITE	6.79	N/A	N/A	N/A	ONSITE
Field Temperature	°C	12.77	ONSITE	9.30	N/A	N/A	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	510	A713203	71	N/A	2.0	N/A	A713203
Total Dissolved Solids	mg/L	390	A715652	42	N/A	10	N/A	A715652

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	A713202	<1.0	N/A	1.0	N/A	A713202
Alkalinity (Total as CaCO3)	mg/L	92	A713202	31	N/A	1.0	N/A	A713202
Bicarbonate (HCO3)	mg/L	110	A713202	37	N/A	1.0	N/A	A713202
Carbonate (CO3)	mg/L	<1.0	A713202	<1.0	N/A	1.0	N/A	A713202
Hydroxide (OH)	mg/L	<1.0	A713202	<1.0	N/A	1.0	N/A	A713202
Total Sulphide	mg/L	0.0022	A714873	<0.0018	N/A	0.0018	N/A	A714873
Chloride (Cl)	mg/L	93	A712370	<1.0	N/A	1.0	N/A	A712370
Sulphate (SO4)	mg/L	5.2	A712370	2.5	N/A	1.0	N/A	A712370

Nutrients

Total Ammonia (N)	mg/L	<0.015	A712955	<0.015	<0.015	0.015	0.0040	A713080
Orthophosphate (P)	mg/L	0.0083	A711120	0.0030	N/A	0.0030	0.0030	A711120
Nitrate plus Nitrite (N)	mg/L	0.754	A711115	0.069	N/A	0.020	0.020	A711115

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		BBM883	BBM884	BBM886			
Sampling Date		2022/09/08 09:20	2022/09/08 09:45	2022/09/08 12:00			
COC Number		671453-01-01	671453-01-01	671453-02-01			
	UNITS	WG-11222680-080922 -CXW-09	WG-11222680-080922 -CXW-10	WG-11222680-080922 -CXW-11	RDL	MDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A711116
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	N/A	N/A	ONSITE
Nitrate (N)	mg/L	0.060	0.174	<0.020	0.020	N/A	A709815
Sulphide (as H2S)	mg/L	<0.0020	<0.0020	<0.0020	0.0020	N/A	A710488
Field Parameters							
Field pH	pH	7.45	7.17	0	N/A	N/A	ONSITE
Field Temperature	°C	10.22	9.99	0	N/A	N/A	ONSITE
Misc. Inorganics							
Conductivity	uS/cm	86	130	<2.0	2.0	N/A	A713203
Total Dissolved Solids	mg/L	54	86	<10	10	N/A	A715652
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A713202
Alkalinity (Total as CaCO3)	mg/L	35	47	<1.0	1.0	N/A	A713202
Bicarbonate (HCO3)	mg/L	43	58	<1.0	1.0	N/A	A713202
Carbonate (CO3)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A713202
Hydroxide (OH)	mg/L	<1.0	<1.0	<1.0	1.0	N/A	A713202
Total Sulphide	mg/L	<0.0018	<0.0018	<0.0018	0.0018	N/A	A714873
Chloride (Cl)	mg/L	2.1	4.0	<1.0	1.0	N/A	A712370
Sulphate (SO4)	mg/L	2.6	6.0	<1.0	1.0	N/A	A712370
Nutrients							
Total Ammonia (N)	mg/L	<0.015	<0.015	<0.015	0.015	0.0040	A713080
Orthophosphate (P)	mg/L	0.025	0.0048	<0.0030	0.0030	0.0030	A711120
Nitrate plus Nitrite (N)	mg/L	0.060	0.174	<0.020	0.020	0.020	A711115
RDL = Reportable Detection Limit							
N/A = Not Applicable							



RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		BBM886			
Sampling Date		2022/09/08 12:00			
COC Number		671453-02-01			
	UNITS	WG-11222680-080922 -CXW-11 Lab-Dup	RDL	MDL	QC Batch
Nutrients					
Orthophosphate (P)	mg/L	<0.0030	0.0030	0.0030	A711120
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate					



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

SEMIVOLATILE ORGANICS BY GC-MS (GROUND WATER)

Bureau Veritas ID		BBM875	BBM876	BBM877			
Sampling Date		2022/09/07 12:20	2022/09/07 13:16	2022/09/07 14:00			
COC Number		671453-01-01	671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-01	WG-11222680-070922 -CXW-02	WG-11222680-070922 -CXW-03	RDL	MDL	QC Batch
Polycyclic Aromatics							
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	0.050	A713548
Acenaphthene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A713548
Acridine	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Fluoranthene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A713548
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A713548
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A713548
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A713548
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	80	80	79	N/A	N/A	A713548
D8-ACENAPHTHYLENE (sur.)	%	79	77	77	N/A	N/A	A713548
D8-NAPHTHALENE (sur.)	%	70	70	71	N/A	N/A	A713548
TERPHENYL-D14 (sur.)	%	70	64	59	N/A	N/A	A713548
RDL = Reportable Detection Limit							
N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C268908
Report Date: 2022/09/19

GHD Limited
Client Project #: 11222680-15.1
Site Location: NEW LANDFILL
Your P.O. #: 735-002640-1
Sampler Initials: CXW

SEMIVOLATILE ORGANICS BY GC-MS (GROUND WATER)

Bureau Veritas ID		BBM878	BBM879	BBM880			
Sampling Date		2022/09/07 15:16	2022/09/07 15:41	2022/09/07 16:25			
COC Number		671453-01-01	671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-04	WG-11222680-070922 -CXW-05	WG-11222680-070922 -CXW-06	RDL	MDL	QC Batch
Polycyclic Aromatics							
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	0.050	A713548
Acenaphthene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A713548
Acridine	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Fluoranthene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A713548
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A713548
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A713548
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A713548
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	90	81	81	N/A	N/A	A713548
D8-ACENAPHTHYLENE (sur.)	%	78	79	78	N/A	N/A	A713548
D8-NAPHTHALENE (sur.)	%	70	74	71	N/A	N/A	A713548
TERPHENYL-D14 (sur.)	%	41 (1)	60	54	N/A	N/A	A713548
RDL = Reportable Detection Limit N/A = Not Applicable (1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.							



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

SEMIVOLATILE ORGANICS BY GC-MS (GROUND WATER)

Bureau Veritas ID		BBM881	BBM882	BBM883			
Sampling Date		2022/09/07 16:45	2022/09/08 08:16	2022/09/08 09:20			
COC Number		671453-01-01	671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-07	WG-11222680-080922 -CXW-08	WG-11222680-080922 -CXW-09	RDL	MDL	QC Batch
Polycyclic Aromatics							
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	0.050	A713548
Acenaphthene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A713548
Acridine	ug/L	<0.050	<0.050	<0.050	0.050	0.050	A713548
Fluoranthene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A713548
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	0.020	A713548
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A713548
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A713548
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	78	78	80	N/A	N/A	A713548
D8-ACENAPHTHYLENE (sur.)	%	76	76	77	N/A	N/A	A713548
D8-NAPHTHALENE (sur.)	%	68	68	67	N/A	N/A	A713548
TERPHENYL-D14 (sur.)	%	65	54	57	N/A	N/A	A713548
RDL = Reportable Detection Limit							
N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C268908
Report Date: 2022/09/19

GHD Limited
Client Project #: 11222680-15.1
Site Location: NEW LANDFILL
Your P.O. #: 735-002640-1
Sampler Initials: CXW

SEMIVOLATILE ORGANICS BY GC-MS (GROUND WATER)

Bureau Veritas ID		BBM884	BBM886			
Sampling Date		2022/09/08 09:45	2022/09/08 12:00			
COC Number		671453-01-01	671453-02-01			
	UNITS	WG-11222680-080922 -CXW-10	WG-11222680-080922 -CXW-11	RDL	MDL	QC Batch
Polycyclic Aromatics						
Naphthalene	ug/L	<0.10	<0.10	0.10	0.050	A713548
Acenaphthene	ug/L	<0.050	<0.050	0.050	0.050	A713548
Fluorene	ug/L	<0.050	<0.050	0.050	0.050	A713548
Phenanthrene	ug/L	<0.050	<0.050	0.050	0.050	A713548
Anthracene	ug/L	<0.010	<0.010	0.010	0.010	A713548
Acridine	ug/L	<0.050	<0.050	0.050	0.050	A713548
Fluoranthene	ug/L	<0.020	<0.020	0.020	0.020	A713548
Pyrene	ug/L	<0.020	<0.020	0.020	0.020	A713548
Benzo(a)anthracene	ug/L	<0.010	<0.010	0.010	0.010	A713548
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	0.0050	0.0050	A713548
Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	79	81	N/A	N/A	A713548
D8-ACENAPHTHYLENE (sur.)	%	76	78	N/A	N/A	A713548
D8-NAPHTHALENE (sur.)	%	67	72	N/A	N/A	A713548
TERPHENYL-D14 (sur.)	%	52	53	N/A	N/A	A713548
RDL = Reportable Detection Limit N/A = Not Applicable						



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

TOTAL PETROLEUM HYDROCARBONS (GROUND WATER)

Bureau Veritas ID		BBM875	BBM876	BBM877	BBM878			
Sampling Date		2022/09/07 12:20	2022/09/07 13:16	2022/09/07 14:00	2022/09/07 15:16			
COC Number		671453-01-01	671453-01-01	671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-01	WG-11222680-070922 -CXW-02	WG-11222680-070922 -CXW-03	WG-11222680-070922 -CXW-04	RDL	MDL	QC Batch

Calculated Parameters								
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A709883
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A709883
Ext. Pet. Hydrocarbon								
EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A713551
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A713551
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	89	89	89	90	N/A	N/A	A713551
RDL = Reportable Detection Limit								
N/A = Not Applicable								

Bureau Veritas ID		BBM879	BBM880	BBM881	BBM882			
Sampling Date		2022/09/07 15:41	2022/09/07 16:25	2022/09/07 16:45	2022/09/08 08:16			
COC Number		671453-01-01	671453-01-01	671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-05	WG-11222680-070922 -CXW-06	WG-11222680-070922 -CXW-07	WG-11222680-080922 -CXW-08	RDL	MDL	QC Batch

Calculated Parameters								
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A709883
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A709883
Ext. Pet. Hydrocarbon								
EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A713551
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	0.20	A713551
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	91	89	89	89	N/A	N/A	A713551
RDL = Reportable Detection Limit								
N/A = Not Applicable								



BUREAU
VERITAS

Bureau Veritas Job #: C268908
Report Date: 2022/09/19

GHD Limited
Client Project #: 11222680-15.1
Site Location: NEW LANDFILL
Your P.O. #: 735-002640-1
Sampler Initials: CXW

TOTAL PETROLEUM HYDROCARBONS (GROUND WATER)

Bureau Veritas ID		BBM883	BBM884	BBM886			
Sampling Date		2022/09/08 09:20	2022/09/08 09:45	2022/09/08 12:00			
COC Number		671453-01-01	671453-01-01	671453-02-01			
	UNITS	WG-11222680-080922 -CXW-09	WG-11222680-080922 -CXW-10	WG-11222680-080922 -CXW-11	RDL	MDL	QC Batch
Calculated Parameters							
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	0.20	0.20	A709883
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	0.20	0.20	A709883
Ext. Pet. Hydrocarbon							
EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	0.20	0.20	A713551
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	0.20	0.20	A713551
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	89	88	89	N/A	N/A	A713551
RDL = Reportable Detection Limit N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C268908
Report Date: 2022/09/19

GHD Limited
Client Project #: 11222680-15.1
Site Location: NEW LANDFILL
Your P.O. #: 735-002640-1
Sampler Initials: CXW

MISCELLANEOUS (GROUND WATER)

Bureau Veritas ID		BBM875	BBM876	BBM877			
Sampling Date		2022/09/07 12:20	2022/09/07 13:16	2022/09/07 14:00			
COC Number		671453-01-01	671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-01	WG-11222680-070922 -CXW-02	WG-11222680-070922 -CXW-03	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A710608
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A710608
RDL = Reportable Detection Limit							

Bureau Veritas ID		BBM878	BBM879	BBM880			
Sampling Date		2022/09/07 15:16	2022/09/07 15:41	2022/09/07 16:25			
COC Number		671453-01-01	671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-04	WG-11222680-070922 -CXW-05	WG-11222680-070922 -CXW-06	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A710608
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A710608
RDL = Reportable Detection Limit							

Bureau Veritas ID		BBM881	BBM882	BBM883			
Sampling Date		2022/09/07 16:45	2022/09/08 08:16	2022/09/08 09:20			
COC Number		671453-01-01	671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-07	WG-11222680-080922 -CXW-08	WG-11222680-080922 -CXW-09	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A710608
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A710608
RDL = Reportable Detection Limit							

Bureau Veritas ID		BBM884	BBM886			
Sampling Date		2022/09/08 09:45	2022/09/08 12:00			
COC Number		671453-01-01	671453-02-01			
	UNITS	WG-11222680-080922 -CXW-10	WG-11222680-080922 -CXW-11	RDL	MDL	QC Batch

Calculated Parameters						
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	0.0050	0.0050	A710608
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	<0.0050	0.0050	0.0050	A710608
RDL = Reportable Detection Limit						



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		BBM875	BBM876	BBM877			
Sampling Date		2022/09/07 12:20	2022/09/07 13:16	2022/09/07 14:00			
COC Number		671453-01-01	671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-01	WG-11222680-070922 -CXW-02	WG-11222680-070922 -CXW-03	RDL	MDL	QC Batch

Calculated Parameters							
Dissolved Hardness (CaCO ₃)	mg/L	273	175	136	0.50	0.50	A709809
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0101	<0.0019	0.0019	0.0019	A712330
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	8.1	<3.0	<3.0	3.0	0.030	A712204
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	0.0020	A712204
Dissolved Arsenic (As)	ug/L	0.24	0.67	<0.10	0.10	0.010	A712204
Dissolved Barium (Ba)	ug/L	18.6	8.5	11.7	1.0	0.0020	A712204
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	0.0030	A712204
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	0.0010	A712204
Dissolved Boron (B)	ug/L	<50	<50	<50	50	50	A712204
Dissolved Cadmium (Cd)	ug/L	<0.010	0.011	0.017	0.010	0.0020	A712204
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	0.020	A712204
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.20	0.20	0.20	A712204
Dissolved Copper (Cu)	ug/L	0.23	3.99	<0.20	0.20	0.010	A712204
Dissolved Iron (Fe)	ug/L	9.6	<5.0	<5.0	5.0	0.040	A712204
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	0.0010	A712204
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	2.0	A712204
Dissolved Manganese (Mn)	ug/L	7.7	<1.0	61.5	1.0	0.030	A712204
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	0.0020	A712204
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	0.010	A712204
Dissolved Phosphorus (P)	ug/L	15	22	<10	10	1.0	A712204
Dissolved Selenium (Se)	ug/L	0.19	<0.10	0.24	0.10	0.0060	A712204
Dissolved Silicon (Si)	ug/L	7640	4920	6450	100	0.30	A712204
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	0.0020	A712204
Dissolved Strontium (Sr)	ug/L	148	86.7	65.1	1.0	0.0020	A712204
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A712204
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	0.0050	A712204
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	0.30	A712204
Dissolved Uranium (U)	ug/L	0.35	<0.10	<0.10	0.10	0.0010	A712204
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	0.020	A712204

RDL = Reportable Detection Limit



CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		BBM875	BBM876	BBM877			
Sampling Date		2022/09/07 12:20	2022/09/07 13:16	2022/09/07 14:00			
COC Number		671453-01-01	671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-01	WG-11222680-070922 -CXW-02	WG-11222680-070922 -CXW-03	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	0.050	A712204
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	0.0080	A712204
Dissolved Calcium (Ca)	mg/L	88.3	57.9	44.6	0.050	0.0010	A709810
Dissolved Magnesium (Mg)	mg/L	12.7	7.37	5.93	0.050	0.00050	A709810
Dissolved Potassium (K)	mg/L	0.763	0.531	0.507	0.050	0.0020	A709810
Dissolved Sodium (Na)	mg/L	11.8	7.98	6.36	0.050	0.0010	A709810
Dissolved Sulphur (S)	mg/L	<3.0	44.1	<3.0	3.0	1.0	A709810
RDL = Reportable Detection Limit							

BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		BBM878	BBM879		BBM880			
Sampling Date		2022/09/07 15:16	2022/09/07 15:41		2022/09/07 16:25			
COC Number		671453-01-01	671453-01-01		671453-01-01			
	UNITS	WG-11222680-070922 -CXW-04	WG-11222680-070922 -CXW-05	QC Batch	WG-11222680-070922 -CXW-06	RDL	MDL	QC Batch

Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L	48.0	45.2	A709809	48.6	0.50	0.50	A709809
Elements								
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	A711925	<0.0019	0.0019	0.0019	A711925
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	15.5	<3.0	A712265	54.3	3.0	0.030	A712347
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	A712265	<0.50	0.50	0.0020	A712347
Dissolved Arsenic (As)	ug/L	<0.10	<0.10	A712265	<0.10	0.10	0.010	A712347
Dissolved Barium (Ba)	ug/L	5.6	2.0	A712265	1.3	1.0	0.0020	A712347
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	A712265	<0.10	0.10	0.0030	A712347
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	A712265	<1.0	1.0	0.0010	A712347
Dissolved Boron (B)	ug/L	<50	<50	A712265	<50	50	50	A712347
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	A712265	<0.010	0.010	0.0020	A712347
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	A712265	<1.0	1.0	0.020	A712347
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	A712265	<0.20	0.20	0.20	A712347
Dissolved Copper (Cu)	ug/L	0.25	0.26	A712265	0.92	0.20	0.010	A712347
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	A712265	124	5.0	0.040	A712347
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	A712265	<0.20	0.20	0.0010	A712347
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	A712265	<2.0	2.0	2.0	A712347
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	A712265	7.3	1.0	0.030	A712347
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	A712265	<1.0	1.0	0.0020	A712347
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	A712265	<1.0	1.0	0.010	A712347
Dissolved Phosphorus (P)	ug/L	<10	<10	A712265	<10	10	1.0	A712347
Dissolved Selenium (Se)	ug/L	0.65	0.63	A712265	<0.10	0.10	0.0060	A712347
Dissolved Silicon (Si)	ug/L	7440	7390	A712265	5230	100	0.30	A712347
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	A712265	<0.020	0.020	0.0020	A712347
Dissolved Strontium (Sr)	ug/L	71.5	76.0	A712265	25.6	1.0	0.0020	A712347
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	A712265	<0.010	0.010	0.010	A712347
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	A712265	<5.0	5.0	0.0050	A712347
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	A712265	<5.0	5.0	0.30	A712347
Dissolved Uranium (U)	ug/L	<0.10	<0.10	A712265	<0.10	0.10	0.0010	A712347
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	A712265	<5.0	5.0	0.020	A712347

RDL = Reportable Detection Limit



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		BBM878	BBM879		BBM880			
Sampling Date		2022/09/07 15:16	2022/09/07 15:41		2022/09/07 16:25			
COC Number		671453-01-01	671453-01-01		671453-01-01			
	UNITS	WG-11222680-070922 -CXW-04	WG-11222680-070922 -CXW-05	QC Batch	WG-11222680-070922 -CXW-06	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	A712265	<5.0	5.0	0.050	A712347
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	A712265	<0.10	0.10	0.0080	A712347
Dissolved Calcium (Ca)	mg/L	14.2	13.1	A709810	15.9	0.050	0.0010	A709810
Dissolved Magnesium (Mg)	mg/L	3.06	3.00	A709810	2.14	0.050	0.00050	A709810
Dissolved Potassium (K)	mg/L	0.303	0.287	A709810	0.186	0.050	0.0020	A709810
Dissolved Sodium (Na)	mg/L	30.6	30.9	A709810	4.25	0.050	0.0010	A709810
Dissolved Sulphur (S)	mg/L	4.1	4.6	A709810	<3.0	3.0	1.0	A709810
RDL = Reportable Detection Limit								



BUREAU
VERITAS

Bureau Veritas Job #: C268908
Report Date: 2022/09/19

GHD Limited
Client Project #: 11222680-15.1
Site Location: NEW LANDFILL
Your P.O. #: 735-002640-1
Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		BBM880		BBM881	BBM882			
Sampling Date		2022/09/07 16:25		2022/09/07 16:45	2022/09/08 08:16			
COC Number		671453-01-01		671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-06 Lab-Dup	QC Batch	WG-11222680-070922 -CXW-07	WG-11222680-080922 -CXW-08	RDL	MDL	QC Batch

Calculated Parameters

Dissolved Hardness (CaCO3)	mg/L	N/A	A709809	175	31.6	0.50	0.50	A709809

Elements

Dissolved Mercury (Hg)	ug/L	<0.0019	A711925	<0.0019	<0.0019	0.0019	0.0019	A712330

Dissolved Metals by ICPMS

Dissolved Aluminum (Al)	ug/L	N/A	A712347	<3.0	<3.0	3.0	0.030	A712347
Dissolved Antimony (Sb)	ug/L	N/A	A712347	<0.50	<0.50	0.50	0.0020	A712347
Dissolved Arsenic (As)	ug/L	N/A	A712347	0.14	<0.10	0.10	0.010	A712347
Dissolved Barium (Ba)	ug/L	N/A	A712347	22.1	1.0	1.0	0.0020	A712347
Dissolved Beryllium (Be)	ug/L	N/A	A712347	<0.10	<0.10	0.10	0.0030	A712347
Dissolved Bismuth (Bi)	ug/L	N/A	A712347	<1.0	<1.0	1.0	0.0010	A712347
Dissolved Boron (B)	ug/L	N/A	A712347	<50	<50	50	50	A712347
Dissolved Cadmium (Cd)	ug/L	N/A	A712347	0.017	<0.010	0.010	0.0020	A712347
Dissolved Chromium (Cr)	ug/L	N/A	A712347	<1.0	<1.0	1.0	0.020	A712347
Dissolved Cobalt (Co)	ug/L	N/A	A712347	<0.20	<0.20	0.20	0.20	A712347
Dissolved Copper (Cu)	ug/L	N/A	A712347	0.30	<0.20	0.20	0.010	A712347
Dissolved Iron (Fe)	ug/L	N/A	A712347	5.7	5.1	5.0	0.040	A712347
Dissolved Lead (Pb)	ug/L	N/A	A712347	<0.20	<0.20	0.20	0.0010	A712347
Dissolved Lithium (Li)	ug/L	N/A	A712347	<2.0	<2.0	2.0	2.0	A712347
Dissolved Manganese (Mn)	ug/L	N/A	A712347	60.5	<1.0	1.0	0.030	A712347
Dissolved Molybdenum (Mo)	ug/L	N/A	A712347	<1.0	<1.0	1.0	0.0020	A712347
Dissolved Nickel (Ni)	ug/L	N/A	A712347	<1.0	<1.0	1.0	0.010	A712347
Dissolved Phosphorus (P)	ug/L	N/A	A712347	<10	<10	10	1.0	A712347
Dissolved Selenium (Se)	ug/L	N/A	A712347	<0.10	<0.10	0.10	0.0060	A712347
Dissolved Silicon (Si)	ug/L	N/A	A712347	13000	2840	100	0.30	A712347
Dissolved Silver (Ag)	ug/L	N/A	A712347	<0.020	<0.020	0.020	0.0020	A712347
Dissolved Strontium (Sr)	ug/L	N/A	A712347	103	13.6	1.0	0.0020	A712347
Dissolved Thallium (Tl)	ug/L	N/A	A712347	<0.010	<0.010	0.010	0.010	A712347
Dissolved Tin (Sn)	ug/L	N/A	A712347	<5.0	<5.0	5.0	0.0050	A712347
Dissolved Titanium (Ti)	ug/L	N/A	A712347	<5.0	<5.0	5.0	0.30	A712347

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable



CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		BBM880		BBM881	BBM882			
Sampling Date		2022/09/07 16:25		2022/09/07 16:45	2022/09/08 08:16			
COC Number		671453-01-01		671453-01-01	671453-01-01			
	UNITS	WG-11222680-070922 -CXW-06 Lab-Dup	QC Batch	WG-11222680-070922 -CXW-07	WG-11222680-080922 -CXW-08	RDL	MDL	QC Batch
Dissolved Uranium (U)	ug/L	N/A	A712347	<0.10	<0.10	0.10	0.0010	A712347
Dissolved Vanadium (V)	ug/L	N/A	A712347	<5.0	<5.0	5.0	0.020	A712347
Dissolved Zinc (Zn)	ug/L	N/A	A712347	<5.0	<5.0	5.0	0.050	A712347
Dissolved Zirconium (Zr)	ug/L	N/A	A712347	<0.10	<0.10	0.10	0.0080	A712347
Dissolved Calcium (Ca)	mg/L	N/A	A709810	44.7	10.6	0.050	0.0010	A709810
Dissolved Magnesium (Mg)	mg/L	N/A	A709810	15.4	1.27	0.050	0.00050	A709810
Dissolved Potassium (K)	mg/L	N/A	A709810	1.06	0.129	0.050	0.0020	A709810
Dissolved Sodium (Na)	mg/L	N/A	A709810	25.3	0.795	0.050	0.0010	A709810
Dissolved Sulphur (S)	mg/L	N/A	A709810	<3.0	<3.0	3.0	1.0	A709810
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable								



BUREAU
VERITAS

Bureau Veritas Job #: C268908
Report Date: 2022/09/19

GHD Limited
Client Project #: 11222680-15.1
Site Location: NEW LANDFILL
Your P.O. #: 735-002640-1
Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		BBM883		BBM884			
Sampling Date		2022/09/08 09:20		2022/09/08 09:45			
COC Number		671453-01-01		671453-01-01			
	UNITS	WG-11222680-080922 -CXW-09	QC Batch	WG-11222680-080922 -CXW-10	RDL	MDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO ₃)	mg/L	38.9	A709809	52.6	0.50	0.50	A710609
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	A712330	<0.0019	0.0019	0.0019	A712330
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	4.4	A712347	4.0	3.0	0.030	A712347
Dissolved Antimony (Sb)	ug/L	<0.50	A712347	<0.50	0.50	0.0020	A712347
Dissolved Arsenic (As)	ug/L	0.72	A712347	<0.10	0.10	0.010	A712347
Dissolved Barium (Ba)	ug/L	2.2	A712347	1.5	1.0	0.0020	A712347
Dissolved Beryllium (Be)	ug/L	<0.10	A712347	<0.10	0.10	0.0030	A712347
Dissolved Bismuth (Bi)	ug/L	<1.0	A712347	<1.0	1.0	0.0010	A712347
Dissolved Boron (B)	ug/L	<50	A712347	<50	50	50	A712347
Dissolved Cadmium (Cd)	ug/L	<0.010	A712347	<0.010	0.010	0.0020	A712347
Dissolved Chromium (Cr)	ug/L	<1.0	A712347	<1.0	1.0	0.020	A712347
Dissolved Cobalt (Co)	ug/L	<0.20	A712347	<0.20	0.20	0.20	A712347
Dissolved Copper (Cu)	ug/L	<0.20	A712347	0.23	0.20	0.010	A712347
Dissolved Iron (Fe)	ug/L	<5.0	A712347	<5.0	5.0	0.040	A712347
Dissolved Lead (Pb)	ug/L	<0.20	A712347	<0.20	0.20	0.0010	A712347
Dissolved Lithium (Li)	ug/L	<2.0	A712347	<2.0	2.0	2.0	A712347
Dissolved Manganese (Mn)	ug/L	<1.0	A712347	<1.0	1.0	0.030	A712347
Dissolved Molybdenum (Mo)	ug/L	<1.0	A712347	<1.0	1.0	0.0020	A712347
Dissolved Nickel (Ni)	ug/L	<1.0	A712347	<1.0	1.0	0.010	A712347
Dissolved Phosphorus (P)	ug/L	23	A712347	<10	10	1.0	A712347
Dissolved Selenium (Se)	ug/L	<0.10	A712347	0.11	0.10	0.0060	A712347
Dissolved Silicon (Si)	ug/L	3710	A712347	5860	100	0.30	A712347
Dissolved Silver (Ag)	ug/L	<0.020	A712347	<0.020	0.020	0.0020	A712347
Dissolved Strontium (Sr)	ug/L	14.6	A712347	24.7	1.0	0.0020	A712347
Dissolved Thallium (Tl)	ug/L	<0.010	A712347	<0.010	0.010	0.010	A712347
Dissolved Tin (Sn)	ug/L	<5.0	A712347	<5.0	5.0	0.0050	A712347
Dissolved Titanium (Ti)	ug/L	<5.0	A712347	<5.0	5.0	0.30	A712347
Dissolved Uranium (U)	ug/L	<0.10	A712347	<0.10	0.10	0.0010	A712347
Dissolved Vanadium (V)	ug/L	6.1	A712347	<5.0	5.0	0.020	A712347
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		BBM883		BBM884			
Sampling Date		2022/09/08 09:20		2022/09/08 09:45			
COC Number		671453-01-01		671453-01-01			
	UNITS	WG-11222680-080922 -CXW-09	QC Batch	WG-11222680-080922 -CXW-10	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	A712347	<5.0	5.0	0.050	A712347
Dissolved Zirconium (Zr)	ug/L	<0.10	A712347	<0.10	0.10	0.0080	A712347
Dissolved Calcium (Ca)	mg/L	12.6	A709810	16.5	0.050	0.0010	A709810
Dissolved Magnesium (Mg)	mg/L	1.80	A709810	2.74	0.050	0.00050	A709810
Dissolved Potassium (K)	mg/L	0.170	A709810	0.202	0.050	0.0020	A709810
Dissolved Sodium (Na)	mg/L	1.03	A709810	3.40	0.050	0.0010	A709810
Dissolved Sulphur (S)	mg/L	<3.0	A709810	<3.0	3.0	1.0	A709810
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C268908
Report Date: 2022/09/19

GHD Limited
Client Project #: 11222680-15.1
Site Location: NEW LANDFILL
Your P.O. #: 735-002640-1
Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		BBM886			
Sampling Date		2022/09/08 12:00			
COC Number		671453-02-01			
	UNITS	WG-11222680-080922 -CXW-11	RDL	MDL	QC Batch

Calculated Parameters

Dissolved Hardness (CaCO ₃)	mg/L	<0.50	0.50	0.50	A710609

Elements

Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	0.0019	A711925

Dissolved Metals by ICPMS

Dissolved Aluminum (Al)	ug/L	<3.0	3.0	0.030	A712347
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	0.0020	A712347
Dissolved Arsenic (As)	ug/L	<0.10	0.10	0.010	A712347
Dissolved Barium (Ba)	ug/L	<1.0	1.0	0.0020	A712347
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	0.0030	A712347
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	0.0010	A712347
Dissolved Boron (B)	ug/L	<50	50	50	A712347
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	0.0020	A712347
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	0.020	A712347
Dissolved Cobalt (Co)	ug/L	<0.20	0.20	0.20	A712347
Dissolved Copper (Cu)	ug/L	<0.20	0.20	0.010	A712347
Dissolved Iron (Fe)	ug/L	<5.0	5.0	0.040	A712347
Dissolved Lead (Pb)	ug/L	<0.20	0.20	0.0010	A712347
Dissolved Lithium (Li)	ug/L	<2.0	2.0	2.0	A712347
Dissolved Manganese (Mn)	ug/L	<1.0	1.0	0.030	A712347
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	0.0020	A712347
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	0.010	A712347
Dissolved Phosphorus (P)	ug/L	<10	10	1.0	A712347
Dissolved Selenium (Se)	ug/L	<0.10	0.10	0.0060	A712347
Dissolved Silicon (Si)	ug/L	<100	100	0.30	A712347
Dissolved Silver (Ag)	ug/L	<0.020	0.020	0.0020	A712347
Dissolved Strontium (Sr)	ug/L	<1.0	1.0	0.0020	A712347
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	0.010	A712347
Dissolved Tin (Sn)	ug/L	<5.0	5.0	0.0050	A712347
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	0.30	A712347
Dissolved Uranium (U)	ug/L	<0.10	0.10	0.0010	A712347
Dissolved Vanadium (V)	ug/L	<5.0	5.0	0.020	A712347

RDL = Reportable Detection Limit



BUREAU
VERITAS

Bureau Veritas Job #: C268908
Report Date: 2022/09/19

GHD Limited
Client Project #: 11222680-15.1
Site Location: NEW LANDFILL
Your P.O. #: 735-002640-1
Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		BBM886			
Sampling Date		2022/09/08 12:00			
COC Number		671453-02-01			
	UNITS	WG-11222680-080922 -CXW-11	RDL	MDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	0.050	A712347
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	0.0080	A712347
Dissolved Calcium (Ca)	mg/L	<0.050	0.050	0.0010	A709810
Dissolved Magnesium (Mg)	mg/L	<0.050	0.050	0.00050	A709810
Dissolved Potassium (K)	mg/L	<0.050	0.050	0.0020	A709810
Dissolved Sodium (Na)	mg/L	<0.050	0.050	0.0010	A709810
Dissolved Sulphur (S)	mg/L	<3.0	3.0	1.0	A709810
RDL = Reportable Detection Limit					



**BUREAU
VERITAS**

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

GENERAL COMMENTS

Results relate only to the items tested.

BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

QUALITY ASSURANCE REPORT

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A713548	D10-ANTHRACENE (sur.)	2022/09/14			95	50 - 140	81	%		
A713548	D8-ACENAPHTHYLENE (sur.)	2022/09/14			90	50 - 140	78	%		
A713548	D8-NAPHTHALENE (sur.)	2022/09/14			81	50 - 140	66	%		
A713548	TERPHENYL-D14 (sur.)	2022/09/14			81	50 - 140	62	%		
A713551	O-TERPHENYL (sur.)	2022/09/13			82	60 - 140	90	%		
A711113	Nitrate plus Nitrite (N)	2022/09/10	102	80 - 120	108	80 - 120	<0.020	mg/L	1.1 (1)	25
A711114	Nitrite (N)	2022/09/10	103	80 - 120	105	80 - 120	<0.0050	mg/L	1.7 (1)	20
A711115	Nitrate plus Nitrite (N)	2022/09/10			106	80 - 120	<0.020	mg/L		
A711116	Nitrite (N)	2022/09/10			102	80 - 120	<0.0050	mg/L		
A711120	Orthophosphate (P)	2022/09/10	95 (2)	80 - 120	92	80 - 120	<0.0030	mg/L	NC (3)	20
A711925	Dissolved Mercury (Hg)	2022/09/12	87 (4)	80 - 120	95	80 - 120	<0.0019	ug/L	NC (5)	20
A712204	Dissolved Aluminum (Al)	2022/09/12	88	80 - 120	88	80 - 120	<3.0	ug/L	0.92 (1)	20
A712204	Dissolved Antimony (Sb)	2022/09/12	100	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20
A712204	Dissolved Arsenic (As)	2022/09/12	103	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
A712204	Dissolved Barium (Ba)	2022/09/12	98	80 - 120	97	80 - 120	<1.0	ug/L	0.61 (1)	20
A712204	Dissolved Beryllium (Be)	2022/09/12	102	80 - 120	100	80 - 120	<0.10	ug/L	NC (1)	20
A712204	Dissolved Bismuth (Bi)	2022/09/12	91	80 - 120	92	80 - 120	<1.0	ug/L		
A712204	Dissolved Boron (B)	2022/09/12	103	80 - 120	101	80 - 120	<50	ug/L	NC (1)	20
A712204	Dissolved Cadmium (Cd)	2022/09/12	100	80 - 120	100	80 - 120	<0.010	ug/L	1.0 (1)	20
A712204	Dissolved Chromium (Cr)	2022/09/12	98	80 - 120	99	80 - 120	<1.0	ug/L	NC (1)	20
A712204	Dissolved Cobalt (Co)	2022/09/12	98	80 - 120	98	80 - 120	<0.20	ug/L	0.044 (1)	20
A712204	Dissolved Copper (Cu)	2022/09/12	98	80 - 120	100	80 - 120	<0.20	ug/L	1.9 (1)	20
A712204	Dissolved Iron (Fe)	2022/09/12	101	80 - 120	97	80 - 120	<5.0	ug/L	NC (1)	20
A712204	Dissolved Lead (Pb)	2022/09/12	95	80 - 120	96	80 - 120	<0.20	ug/L	NC (1)	20
A712204	Dissolved Lithium (Li)	2022/09/12	102	80 - 120	100	80 - 120	<2.0	ug/L	NC (1)	20
A712204	Dissolved Manganese (Mn)	2022/09/12	93	80 - 120	93	80 - 120	<1.0	ug/L	1.6 (1)	20
A712204	Dissolved Molybdenum (Mo)	2022/09/12	103	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
A712204	Dissolved Nickel (Ni)	2022/09/12	93	80 - 120	94	80 - 120	<1.0	ug/L	NC (1)	20
A712204	Dissolved Phosphorus (P)	2022/09/12	93	80 - 120	93	80 - 120	<10	ug/L		
A712204	Dissolved Selenium (Se)	2022/09/12	101	80 - 120	99	80 - 120	<0.10	ug/L	NC (1)	20
A712204	Dissolved Silicon (Si)	2022/09/12	80	80 - 120	80	80 - 120	<100	ug/L		



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A712204	Dissolved Silver (Ag)	2022/09/12	98	80 - 120	99	80 - 120	<0.020	ug/L	NC (1)	20
A712204	Dissolved Strontium (Sr)	2022/09/12	101	80 - 120	92	80 - 120	<1.0	ug/L	3.3 (1)	20
A712204	Dissolved Thallium (Tl)	2022/09/12	92	80 - 120	93	80 - 120	<0.010	ug/L	NC (1)	20
A712204	Dissolved Tin (Sn)	2022/09/12	100	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
A712204	Dissolved Titanium (Ti)	2022/09/12	98	80 - 120	98	80 - 120	<5.0	ug/L	NC (1)	20
A712204	Dissolved Uranium (U)	2022/09/12	98	80 - 120	99	80 - 120	<0.10	ug/L	NC (1)	20
A712204	Dissolved Vanadium (V)	2022/09/12	99	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
A712204	Dissolved Zinc (Zn)	2022/09/12	100	80 - 120	104	80 - 120	<5.0	ug/L	3.2 (1)	20
A712204	Dissolved Zirconium (Zr)	2022/09/12	102	80 - 120	100	80 - 120	<0.10	ug/L		
A712265	Dissolved Aluminum (Al)	2022/09/13	97	80 - 120	101	80 - 120	<3.0	ug/L	NC (1)	20
A712265	Dissolved Antimony (Sb)	2022/09/13	97	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20
A712265	Dissolved Arsenic (As)	2022/09/13	NC	80 - 120	103	80 - 120	<0.10	ug/L	0.63 (1)	20
A712265	Dissolved Barium (Ba)	2022/09/13	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.11 (1)	20
A712265	Dissolved Beryllium (Be)	2022/09/13	92	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
A712265	Dissolved Bismuth (Bi)	2022/09/13	90	80 - 120	97	80 - 120	<1.0	ug/L	NC (1)	20
A712265	Dissolved Boron (B)	2022/09/13	NC	80 - 120	114	80 - 120	<50	ug/L	2.2 (1)	20
A712265	Dissolved Cadmium (Cd)	2022/09/13	96	80 - 120	102	80 - 120	<0.010	ug/L	NC (1)	20
A712265	Dissolved Chromium (Cr)	2022/09/13	96	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
A712265	Dissolved Cobalt (Co)	2022/09/13	94	80 - 120	100	80 - 120	<0.20	ug/L	NC (1)	20
A712265	Dissolved Copper (Cu)	2022/09/13	93	80 - 120	101	80 - 120	<0.20	ug/L	NC (1)	20
A712265	Dissolved Iron (Fe)	2022/09/13	101	80 - 120	108	80 - 120	<5.0	ug/L	1.8 (1)	20
A712265	Dissolved Lead (Pb)	2022/09/13	96	80 - 120	100	80 - 120	<0.20	ug/L	NC (1)	20
A712265	Dissolved Lithium (Li)	2022/09/13	83	80 - 120	97	80 - 120	<2.0	ug/L	1.3 (1)	20
A712265	Dissolved Manganese (Mn)	2022/09/13	97	80 - 120	100	80 - 120	<1.0	ug/L	0.92 (1)	20
A712265	Dissolved Molybdenum (Mo)	2022/09/13	103	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
A712265	Dissolved Nickel (Ni)	2022/09/13	95	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
A712265	Dissolved Phosphorus (P)	2022/09/13	101	80 - 120	98	80 - 120	<10	ug/L		
A712265	Dissolved Selenium (Se)	2022/09/13	102	80 - 120	105	80 - 120	<0.10	ug/L	NC (1)	20
A712265	Dissolved Silicon (Si)	2022/09/13	NC	80 - 120	107	80 - 120	<100	ug/L	0.19 (1)	20
A712265	Dissolved Silver (Ag)	2022/09/13	95	80 - 120	101	80 - 120	<0.020	ug/L	NC (1)	20
A712265	Dissolved Strontium (Sr)	2022/09/13	NC	80 - 120	98	80 - 120	<1.0	ug/L	2.1 (1)	20

BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A712265	Dissolved Thallium (Tl)	2022/09/13	94	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
A712265	Dissolved Tin (Sn)	2022/09/13	97	80 - 120	104	80 - 120	<5.0	ug/L	NC (1)	20
A712265	Dissolved Titanium (Ti)	2022/09/13	98	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
A712265	Dissolved Uranium (U)	2022/09/13	98	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
A712265	Dissolved Vanadium (V)	2022/09/13	99	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A712265	Dissolved Zinc (Zn)	2022/09/13	98	80 - 120	104	80 - 120	<5.0	ug/L	NC (1)	20
A712265	Dissolved Zirconium (Zr)	2022/09/13	101	80 - 120	100	80 - 120	<0.10	ug/L	NC (1)	20
A712330	Dissolved Mercury (Hg)	2022/09/12	87 (6)	80 - 120	92	80 - 120	<0.0019	ug/L	NC (1)	20
A712347	Dissolved Aluminum (Al)	2022/09/13	96	80 - 120	100	80 - 120	<3.0	ug/L	NC (1)	20
A712347	Dissolved Antimony (Sb)	2022/09/13	98	80 - 120	102	80 - 120	<0.50	ug/L	NC (1)	20
A712347	Dissolved Arsenic (As)	2022/09/13	99	80 - 120	103	80 - 120	<0.10	ug/L	NC (1)	20
A712347	Dissolved Barium (Ba)	2022/09/13	96	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A712347	Dissolved Beryllium (Be)	2022/09/13	92	80 - 120	93	80 - 120	<0.10	ug/L	NC (1)	20
A712347	Dissolved Bismuth (Bi)	2022/09/13	94	80 - 120	97	80 - 120	<1.0	ug/L	NC (1)	20
A712347	Dissolved Boron (B)	2022/09/13	108	80 - 120	112	80 - 120	<50	ug/L	NC (1)	20
A712347	Dissolved Cadmium (Cd)	2022/09/13	98	80 - 120	102	80 - 120	<0.010	ug/L	NC (1)	20
A712347	Dissolved Chromium (Cr)	2022/09/13	98	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
A712347	Dissolved Cobalt (Co)	2022/09/13	97	80 - 120	101	80 - 120	<0.20	ug/L	NC (1)	20
A712347	Dissolved Copper (Cu)	2022/09/13	98	80 - 120	102	80 - 120	<0.20	ug/L	NC (1)	20
A712347	Dissolved Iron (Fe)	2022/09/13	101	80 - 120	105	80 - 120	<5.0	ug/L	NC (1)	20
A712347	Dissolved Lead (Pb)	2022/09/13	99	80 - 120	102	80 - 120	<0.20	ug/L	NC (1)	20
A712347	Dissolved Lithium (Li)	2022/09/13	89	80 - 120	92	80 - 120	<2.0	ug/L	NC (1)	20
A712347	Dissolved Manganese (Mn)	2022/09/13	96	80 - 120	101	80 - 120	<1.0	ug/L	NC (1)	20
A712347	Dissolved Molybdenum (Mo)	2022/09/13	98	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
A712347	Dissolved Nickel (Ni)	2022/09/13	99	80 - 120	103	80 - 120	<1.0	ug/L	NC (1)	20
A712347	Dissolved Phosphorus (P)	2022/09/13	96	80 - 120	97	80 - 120	<10	ug/L		
A712347	Dissolved Selenium (Se)	2022/09/13	106	80 - 120	106	80 - 120	<0.10	ug/L	NC (1)	20
A712347	Dissolved Silicon (Si)	2022/09/13	102	80 - 120	104	80 - 120	<100	ug/L	NC (1)	20
A712347	Dissolved Silver (Ag)	2022/09/13	97	80 - 120	101	80 - 120	<0.020	ug/L	NC (1)	20
A712347	Dissolved Strontium (Sr)	2022/09/13	93	80 - 120	99	80 - 120	<1.0	ug/L	NC (1)	20
A712347	Dissolved Thallium (Tl)	2022/09/13	95	80 - 120	98	80 - 120	<0.010	ug/L	NC (1)	20



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A712347	Dissolved Tin (Sn)	2022/09/13	98	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A712347	Dissolved Titanium (Ti)	2022/09/13	99	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
A712347	Dissolved Uranium (U)	2022/09/13	96	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
A712347	Dissolved Vanadium (V)	2022/09/13	98	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
A712347	Dissolved Zinc (Zn)	2022/09/13	104	80 - 120	105	80 - 120	<5.0	ug/L	NC (1)	20
A712347	Dissolved Zirconium (Zr)	2022/09/13	96	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
A712370	Chloride (Cl)	2022/09/12	NC	80 - 120	104	80 - 120	<1.0	mg/L	2.0 (1)	20
A712370	Sulphate (SO4)	2022/09/12	NC	80 - 120	101	80 - 120	<1.0	mg/L	3.0 (1)	20
A712647	Chloride (Cl)	2022/09/12	113	80 - 120	104	80 - 120	<1.0	mg/L	NC (1)	20
A712647	Sulphate (SO4)	2022/09/12	104	80 - 120	100	80 - 120	<1.0	mg/L	1.9 (1)	20
A712955	Total Ammonia (N)	2022/09/12	100	80 - 120	104	80 - 120	<0.015	mg/L	NC (1)	20
A713080	Total Ammonia (N)	2022/09/12	100 (7)	80 - 120	103	80 - 120	<0.015	mg/L	NC (8)	20
A713198	Alkalinity (PP as CaCO3)	2022/09/13					<1.0	mg/L	3.3 (1)	20
A713198	Alkalinity (Total as CaCO3)	2022/09/13	NC	80 - 120	93	80 - 120	<1.0	mg/L	0.60 (1)	20
A713198	Bicarbonate (HCO3)	2022/09/13					<1.0	mg/L	0.70 (1)	20
A713198	Carbonate (CO3)	2022/09/13					<1.0	mg/L	3.3 (1)	20
A713198	Hydroxide (OH)	2022/09/13					<1.0	mg/L	NC (1)	20
A713199	Conductivity	2022/09/13			102	80 - 120	<2.0	uS/cm	0.92 (1)	10
A713202	Alkalinity (PP as CaCO3)	2022/09/13					<1.0	mg/L		
A713202	Alkalinity (Total as CaCO3)	2022/09/13	97 (9)	80 - 120	92	80 - 120	<1.0	mg/L		
A713202	Bicarbonate (HCO3)	2022/09/13					<1.0	mg/L		
A713202	Carbonate (CO3)	2022/09/13					<1.0	mg/L		
A713202	Hydroxide (OH)	2022/09/13					<1.0	mg/L		
A713203	Conductivity	2022/09/13			103	80 - 120	<2.0	uS/cm		
A713548	Acenaphthene	2022/09/14			81	50 - 140	<0.050	ug/L	0.73 (1)	40
A713548	Acridine	2022/09/14			96	50 - 140	<0.050	ug/L	NC (1)	40
A713548	Anthracene	2022/09/14			87	50 - 140	<0.010	ug/L	NC (1)	40
A713548	Benzo(a)anthracene	2022/09/14			90	50 - 140	<0.010	ug/L	NC (1)	40
A713548	Benzo(a)pyrene	2022/09/14			86	50 - 140	<0.0050	ug/L	NC (1)	40
A713548	Fluoranthene	2022/09/14			50	50 - 140	<0.020	ug/L	NC (1)	40
A713548	Fluorene	2022/09/14			84	50 - 140	<0.050	ug/L	NC (1)	40



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A713548	Naphthalene	2022/09/14			66	50 - 140	<0.10	ug/L	NC (1)	40
A713548	Phenanthrene	2022/09/14			84	50 - 140	<0.050	ug/L	NC (1)	40
A713548	Pyrene	2022/09/14			70	50 - 140	<0.020	ug/L	NC (1)	40
A713551	EPH (C10-C19)	2022/09/13			99	70 - 130	<0.20	mg/L	NC (1)	30
A713551	EPH (C19-C32)	2022/09/13			102	70 - 130	<0.20	mg/L	NC (1)	30
A714216	Total Dissolved Solids	2022/09/14	102	80 - 120	102	80 - 120	<10	mg/L	3.4 (1)	20
A714873	Total Sulphide	2022/09/14	91	80 - 120	82	80 - 120	<0.0018	mg/L	NC (1)	20
A715652	Total Dissolved Solids	2022/09/15	NC	80 - 120	102	80 - 120	<10	mg/L	0.57 (1)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [BBM886-01]

(3) Duplicate Parent ID [BBM886-01]

(4) Matrix Spike Parent ID [BBM886-04]

(5) Duplicate Parent ID [BBM880-04]

(6) Matrix Spike Parent ID [BBM875-04]

(7) Matrix Spike Parent ID [BBM882-07]

(8) Duplicate Parent ID [BBM882-07]

(9) Matrix Spike Parent ID [BBM880-01]



BUREAU
VERITAS

Bureau Veritas Job #: C268908

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist



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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Bureau Veritas
4006 Canada Way, Burnaby, British Columbia Canada V5G 1K3 Tel: (604) 734 7276 Toll-free 800-563-6296 Fax: (604) 731 2386 www.bvna.com

Page **12**

INVOICE TO:		Report Information		Project Information		Barcode		ie Only										
Company Name	#163 GHD Limited	Company Name	GHD Ltd.	Quotation #	C10010	C268908_COC		Bottle Order #:										
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #	735-002640													
Address	455 PHILLIP STREET WATERLOO ON N2L 3X2	Address		Project #	11222680			571453										
Phone	(519) 884-0510	Phone		Project Name	Upland Landfill	Chain Of Custody Record		Project Manager										
Fax	(519) 725-1394	Fax		Site #	Groundwater	CME 1453-01-01		Thomas Pirosh										
Email	APinvoices-735@ghd.com	Email	airesse.macphee@ghd.com; NationalEODSupport@bma	Sampled By	CXW													
Regulatory Criteria		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)						Turnaround Time (TAT) Required								
☒ CSR ☐ CCME ☐ BC Water Quality ☐ Other		Samples filtered & preserved as needed.		Metals Field Filtered? (Y/N) Conductivity, Cl, SO4, NO2, NO3, N-N, PO4, orthophosphoric Speciated Alkalinity Sulphide + H2S Calc Sulphide, Un-ionized (as H2S) (Calc) Ammonia-N (Total) Dissolved Metals with CV Hg Hardness Total Dissolved Solids (Filt. Residue) LEPM/HEPM with subtracted PAHs Field pH Field Temperature						Regular (Standard) TAT: (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dissolved Metals are + 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required ☐ Rush Confirmation Number: _____ (Call lab for #) Comments: _____								
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS																		
Sample Barcode Label	Sample Location Identification	Date Sampled	Time Sampled	Main	Metals Field Filtered? (Y/N)	Conductivity, Cl, SO4, NO2, NO3, N-N, PO4, orthophosphoric	Speciated Alkalinity	Sulphide + H2S Calc	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg	Hardness	Total Dissolved Solids (Filt. Residue)	LEPM/HEPM with subtracted PAHs	Field pH	Field Temperature	# of Bottles	Comments
1	WG-11222680-070922-CXW-01	Sept 7, 2022	12:20	GW	Y	X	X	X	X	X	X	X	X	X	7.20	14.47	7	
2	WG-11222680-070922-CXW-02		13:16												7.50	12.78		
3	WG-11222680-070922-CXW-03		14:00												7.55	10.80		
4	WG-11222680-070922-CXW-04		15:16												7.07	10.38		
5	WG-11222680-070922-CXW-05		15:41												6.97	10.01		
6	WG-11222680-070922-CXW-06		16:25												7.29	10.90		
7	WG-11222680-070922-CXW-07		16:45												6.76	12.77		
8	WG-11222680-080922-CXW-08	Sept 8, 2022	08:16												6.89	9.30		
9	WG-11222680-080922-CXW-09		09:20												7.45	10.22		
10	WG-11222680-080922-CXW-10		09:45												7.17	9.99		
* RELINQUISHED BY: (Signature/Print)		Date: (YYMMDD)	Time	RECEIVED BY: (Signature/Print)		Date: (YYMMDD)	Time	# Jars used and not submitted		Lab Use Only		Time Sampled		Temperature (°C) on Receipt	Custody Seal Intact on Delivery		White: Bureau Veritas Yellow: Client	
[Signature]		22/09/09	0955	[Signature]		22/09/09	1030							5.2, 6	☐ Yes ☒ No			
* UNLESS OTHERWISE AGREED, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS. * IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.																		

Bureau Veritas Canada (2019) Inc.



Bureau Veritas
4506 Canada Way, Burnaby, British Columbia Canada V5G 1K3 Tel: (604) 734 7276 Toll-free 800-563-6266 Fax: (604) 731 2386 www.bvna.com

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C268908_COC

Bottle Order #:



671453

Chain Of Custody Record

Project Manager



C#671453-02-01

Thomas Pinchin

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name	GHD Ltd.	Quotation #	C10010
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #	735-002640
Address	455 PHILLIP STREET WATERLOO ON N2L 3X2	Address		Project #	11222680
Phone	(519) 884-0510 Fax: (519) 725-1394	Phone		Project Name	Upland Landfill
Email	APinvoices-735@ghd.com	Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Site #	Groundwater
				Sampled By	CXW

Regulatory Criteria:	Special Instructions	ANALYSIS REQUESTED (PLEASE BE SPECIFIC)												Turnaround Time (TAT) Required:	
☒ CSR ☐ CCME ☐ BC Water Quality ☐ Other	Samples filtered & preserved as needed.	Metals Field Filtered? (Y/N)	Conductivity, Cl, SO ₄ , NO ₃ , N+N, PO ₄ , or phosphorus phosphate	Speciated Alkalinity	Sulphide + H ₂ S Calc	Sulphide, Un-ionized (as H ₂ S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg, Hardness	Total Dissolved Solids (Filt. Residue)	LEPH/NEPH with subtracted PAHs	Field pH	Field Temperature	Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐ Rush Confirmation Number: ☐ (call lab for #)		

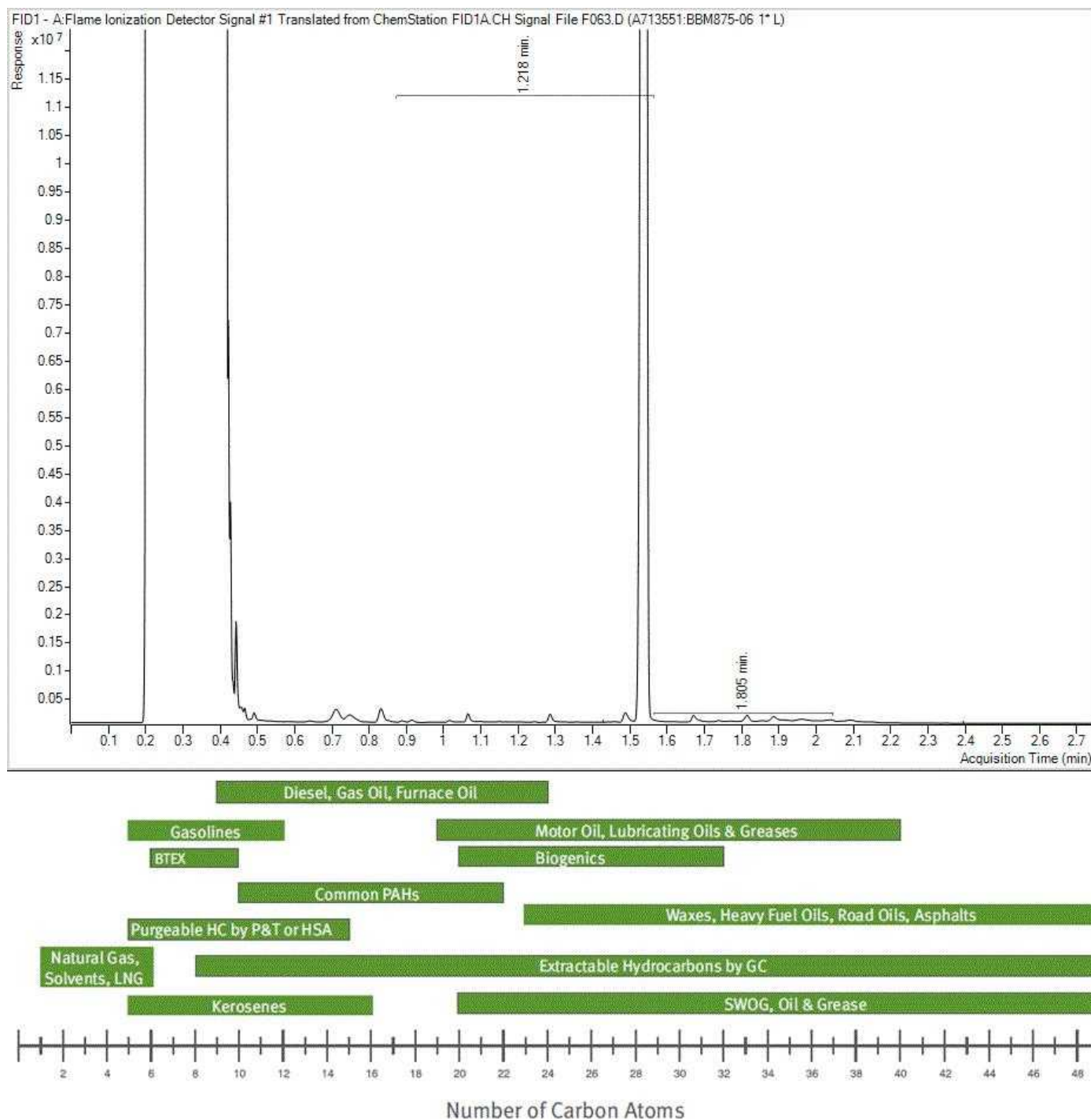
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS						Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y/N)	Conductivity, Cl, SO ₄ , NO ₃ , N+N, PO ₄ , or phosphorus phosphate	Speciated Alkalinity	Sulphide + H ₂ S Calc	Sulphide, Un-ionized (as H ₂ S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg, Hardness	Total Dissolved Solids (Filt. Residue)	LEPH/NEPH with subtracted PAHs	Field pH	Field Temperature	# of Bottles	Comments
1							WG-11222680-080921-CXW-11	Sept 8, 2022	12:00	GW	Y	X	X	X	X	X	X	X	X	NA	NA	7	
2																							
3																							
4																							
5																							
6																							
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9																							
10																							

* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	* RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only		
		Sept 9, 2022	0955			22/09/2022	1030		Time Sensitive ☐	Temperature (°C) on Receipt: 3, 2, 6	Custody Seal Intact on Cooler? ☐ Yes ☒ No
* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS.											
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.											

Bureau Veritas Canada (2019) Inc.

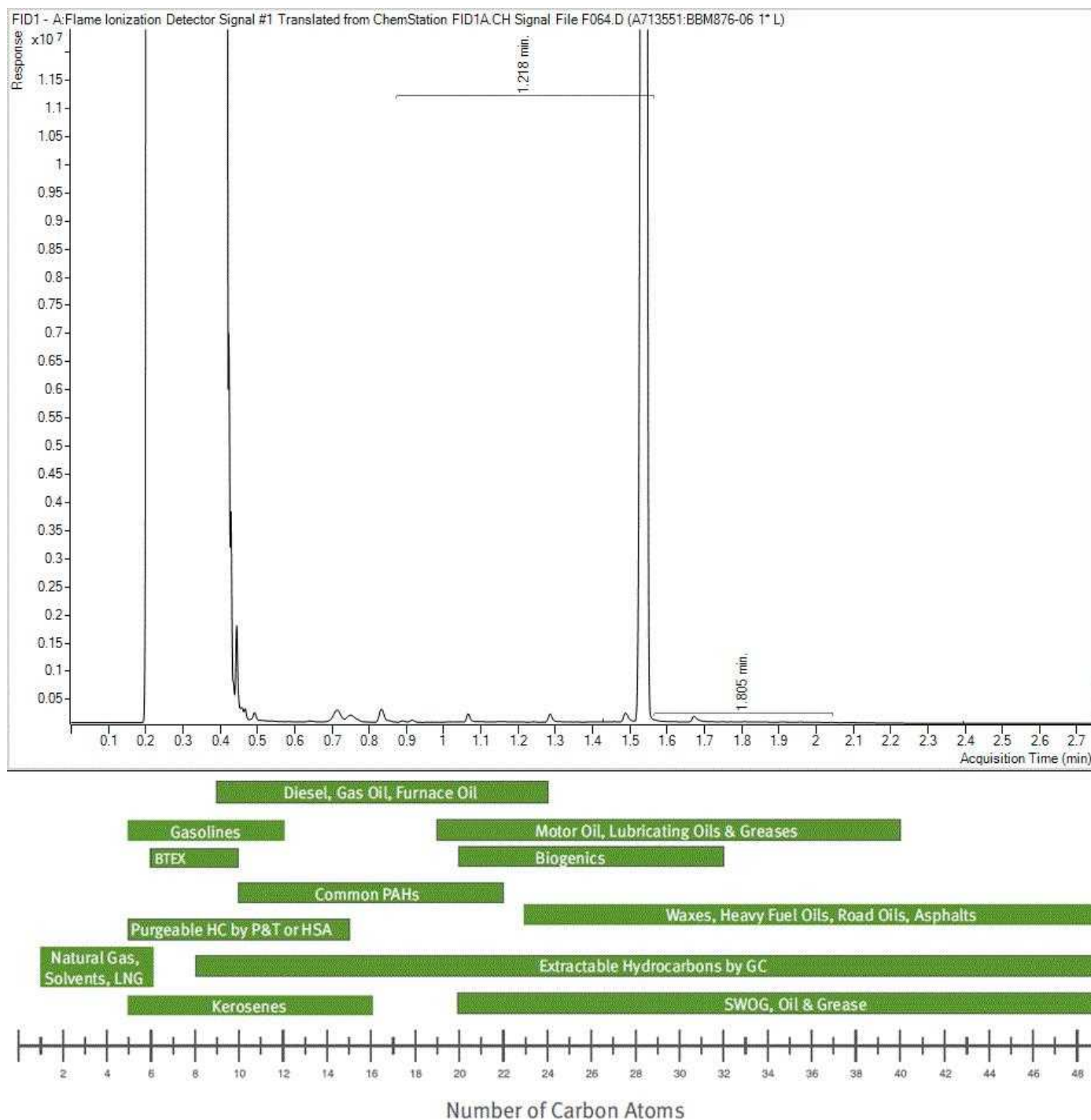
ice: yes

EPH in Water when PAH required Chromatogram



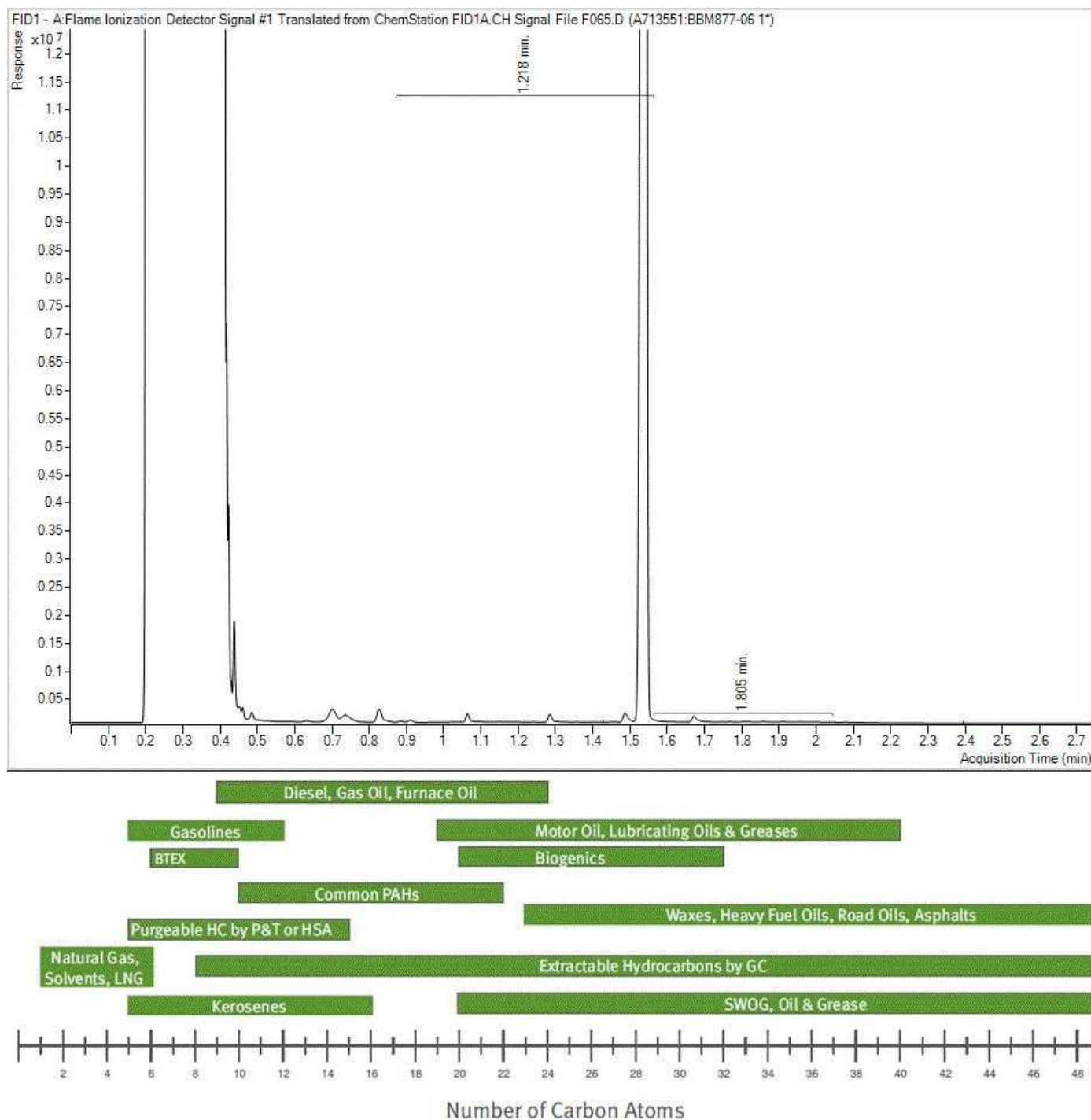
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



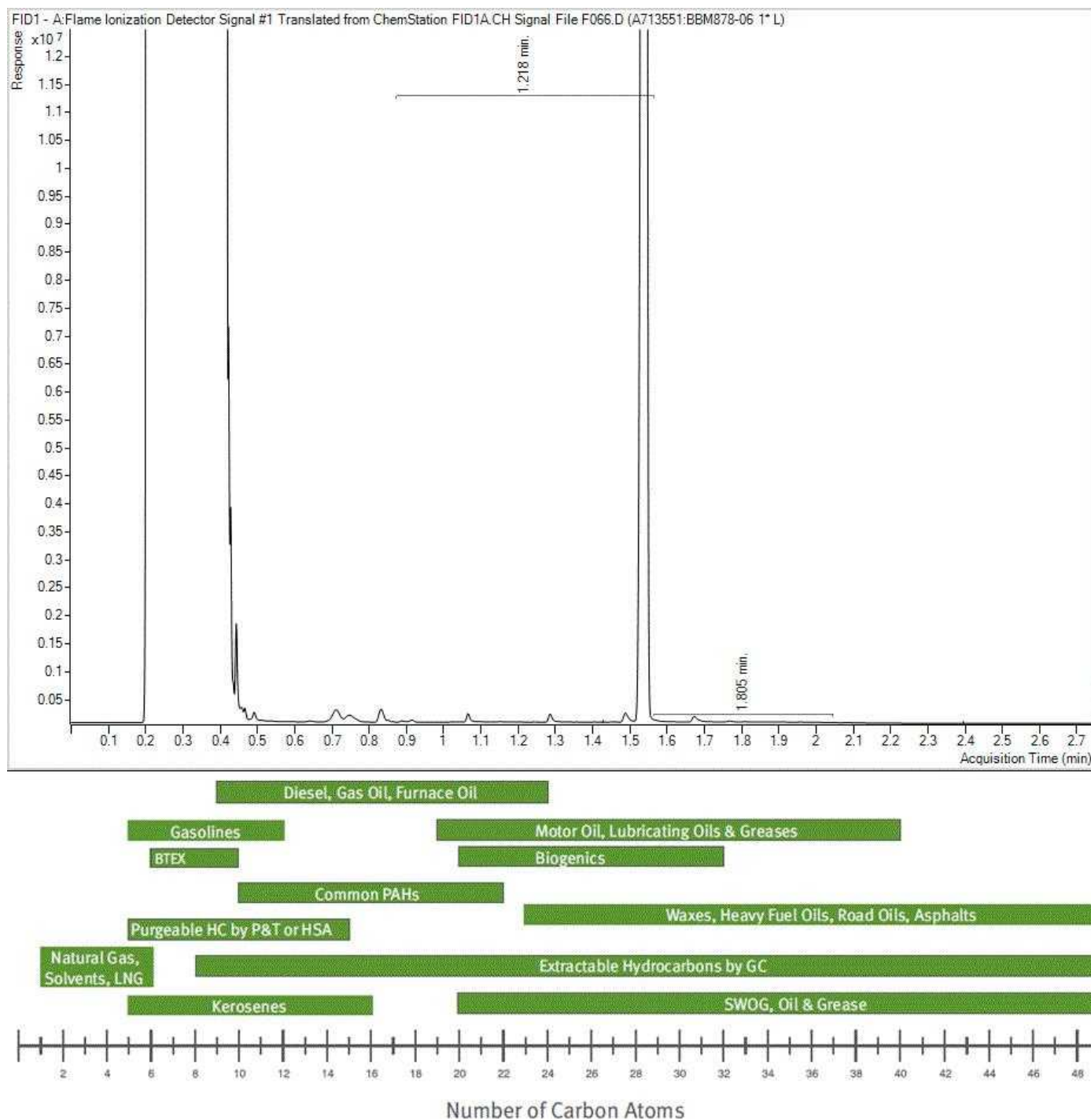
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



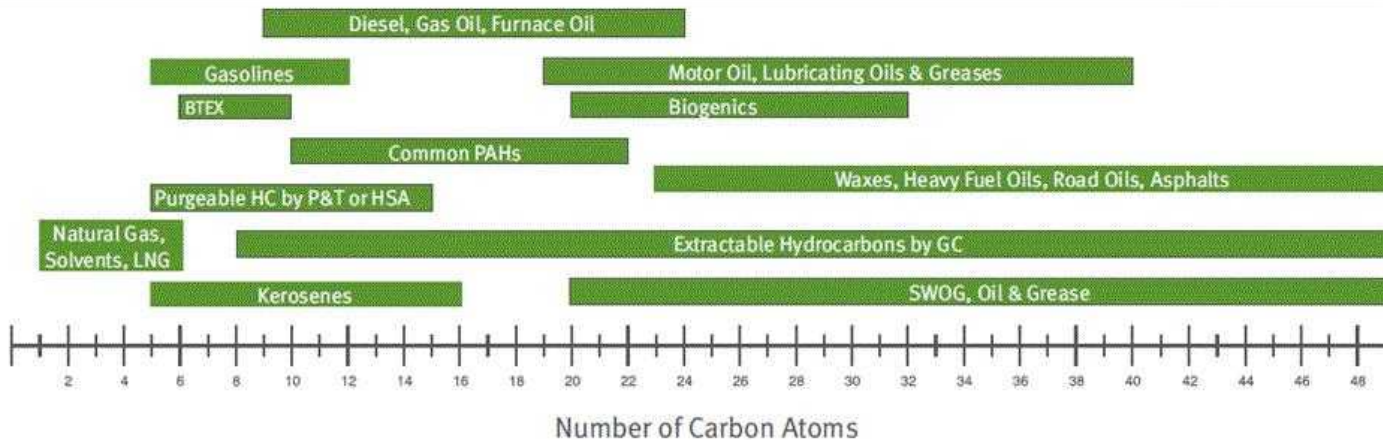
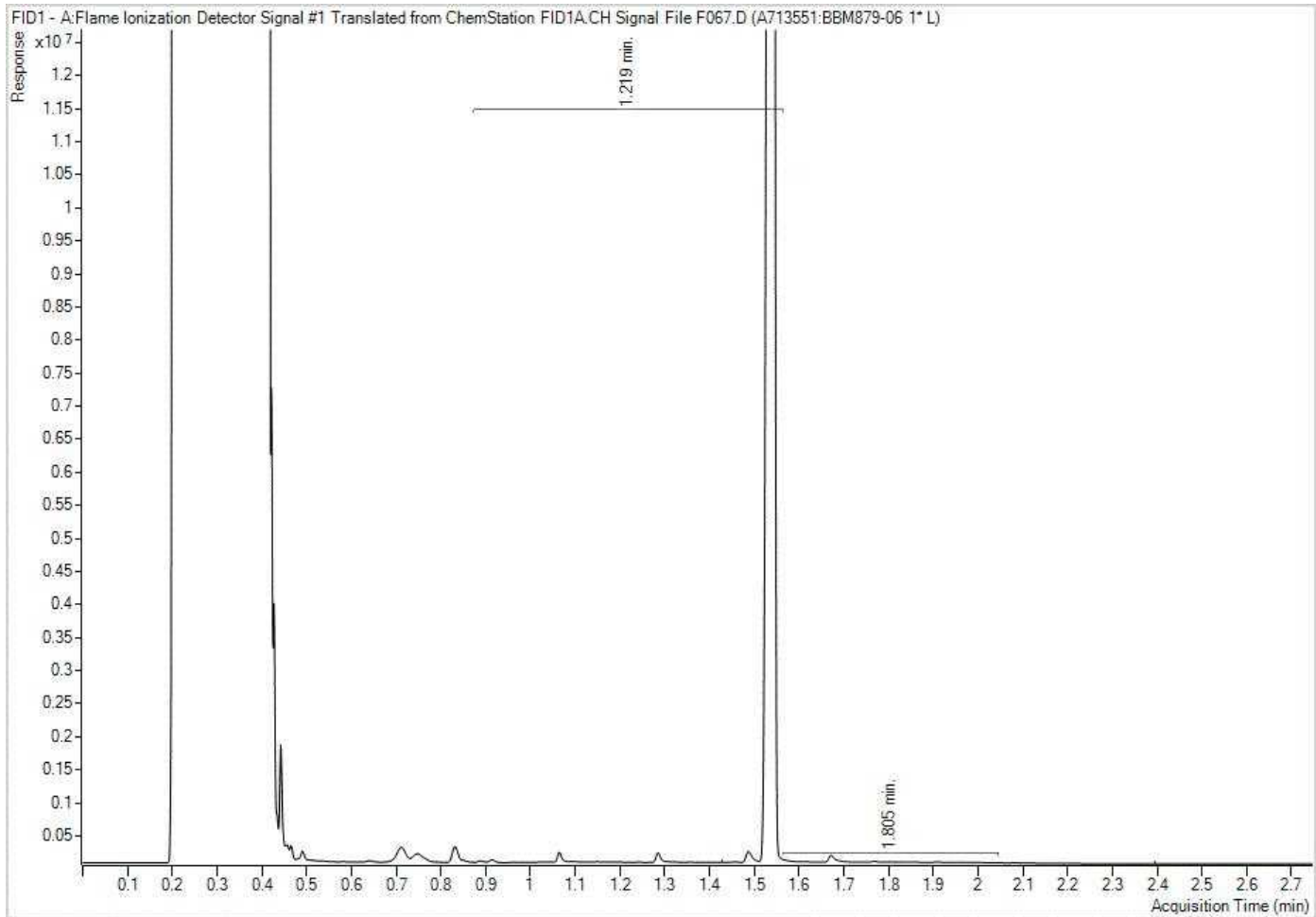
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



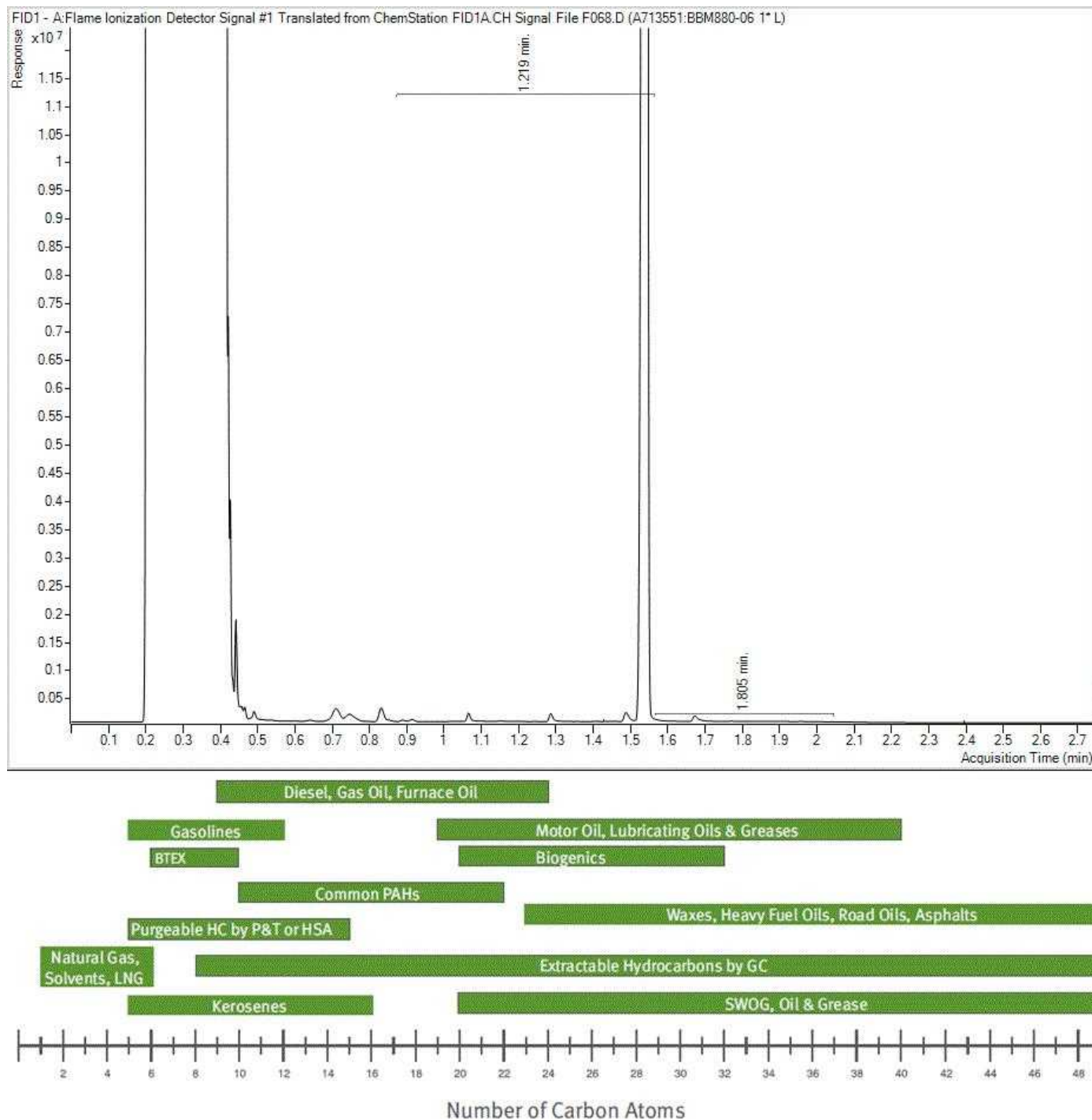
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



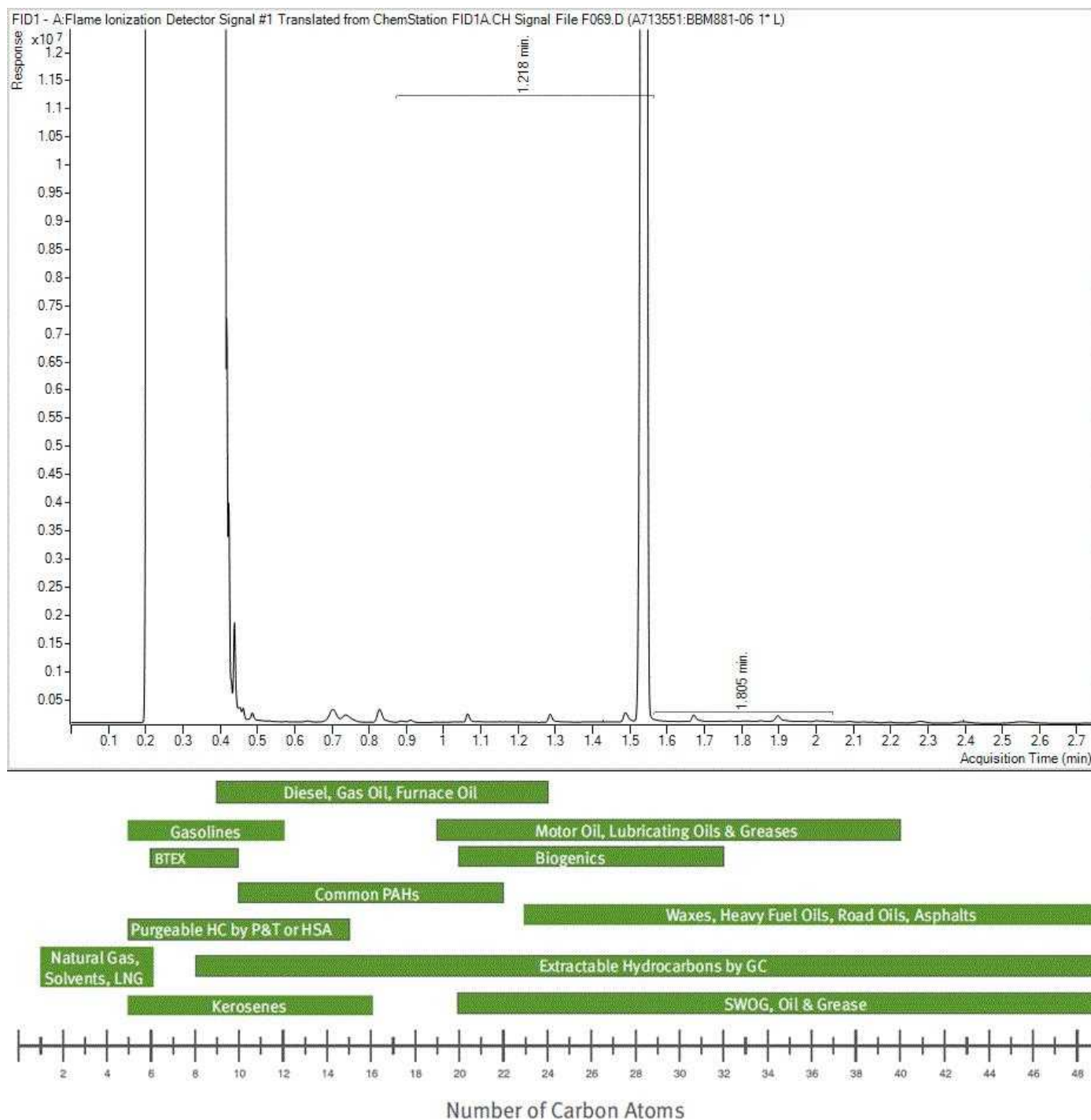
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



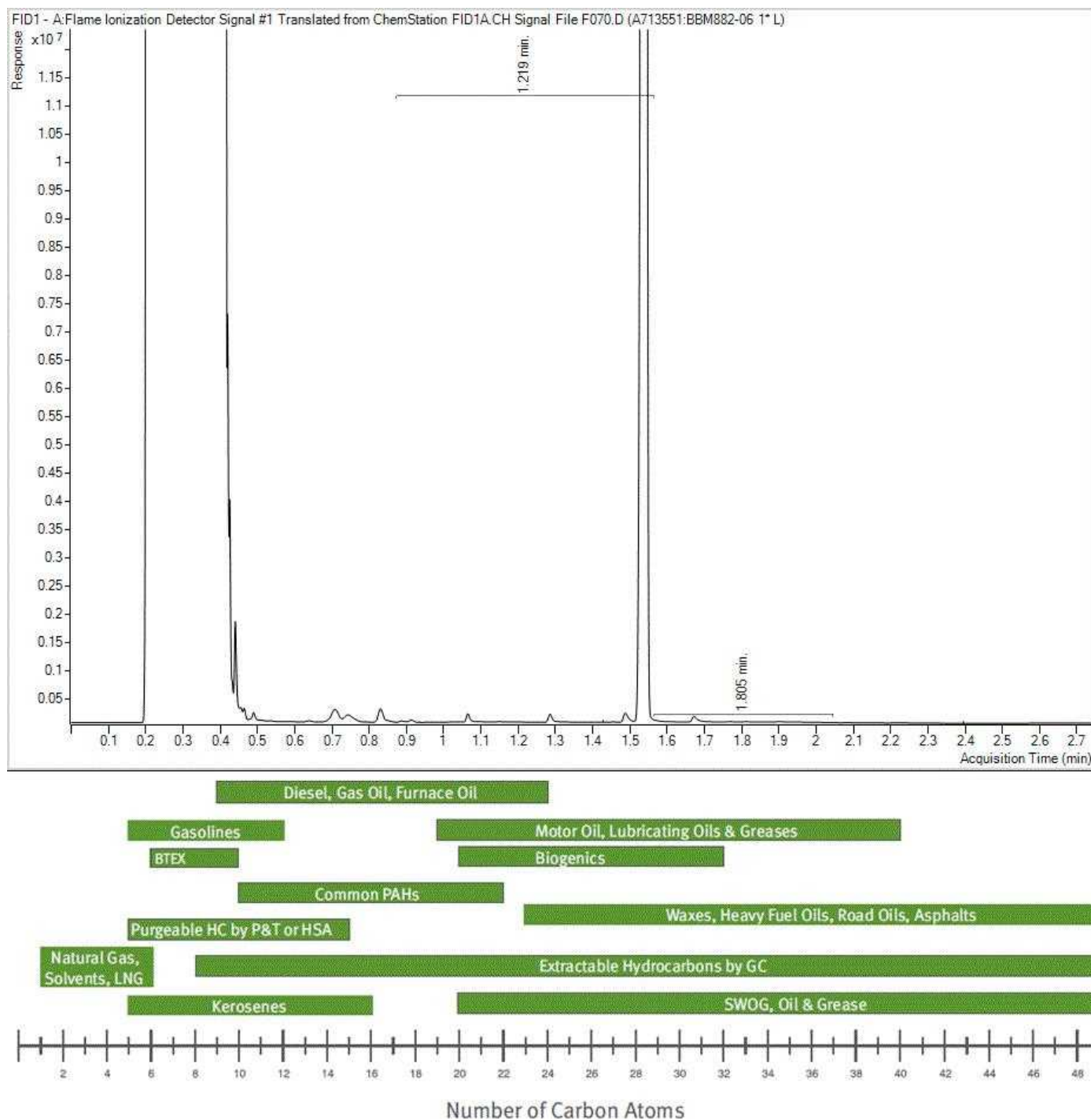
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



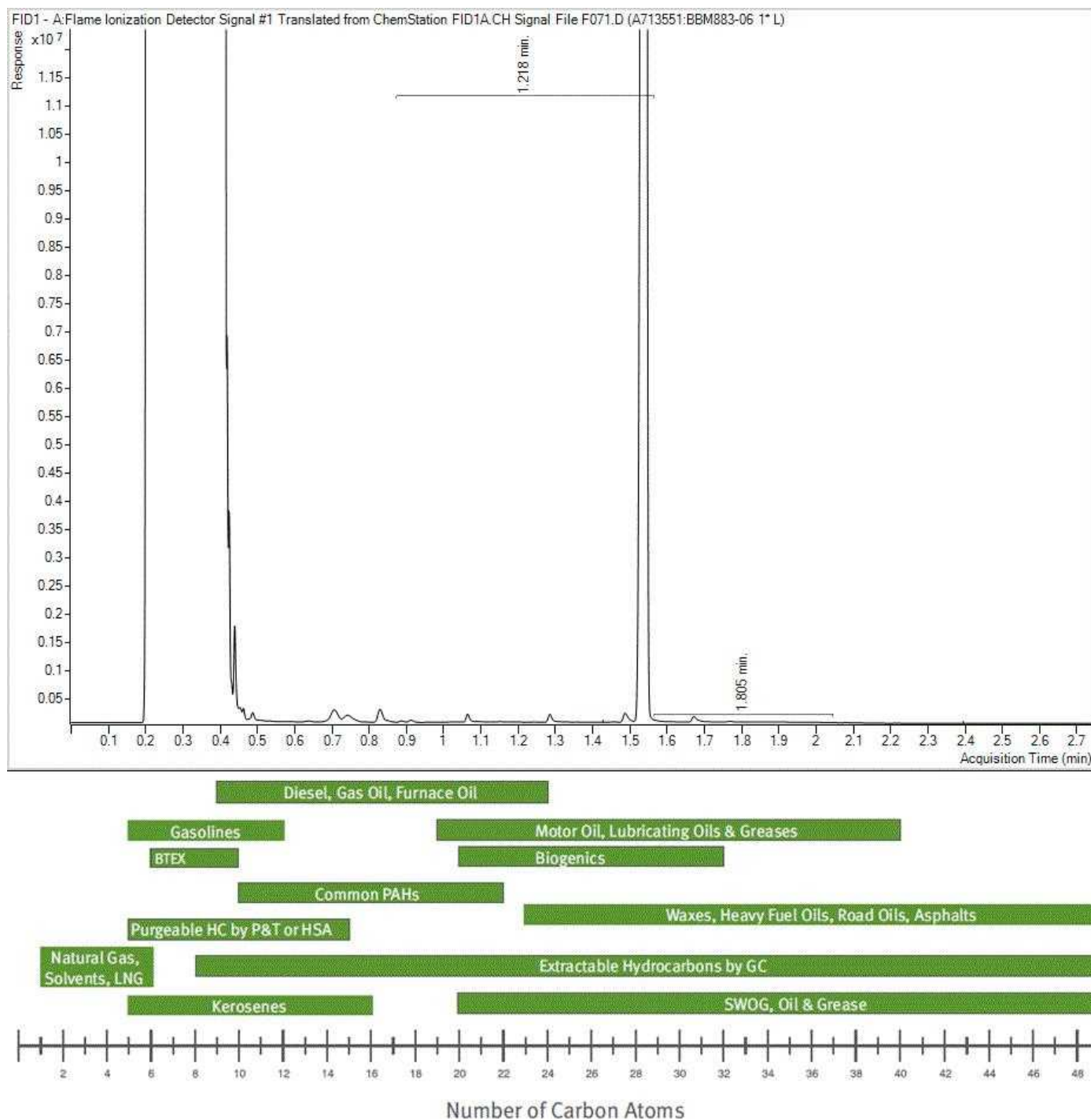
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



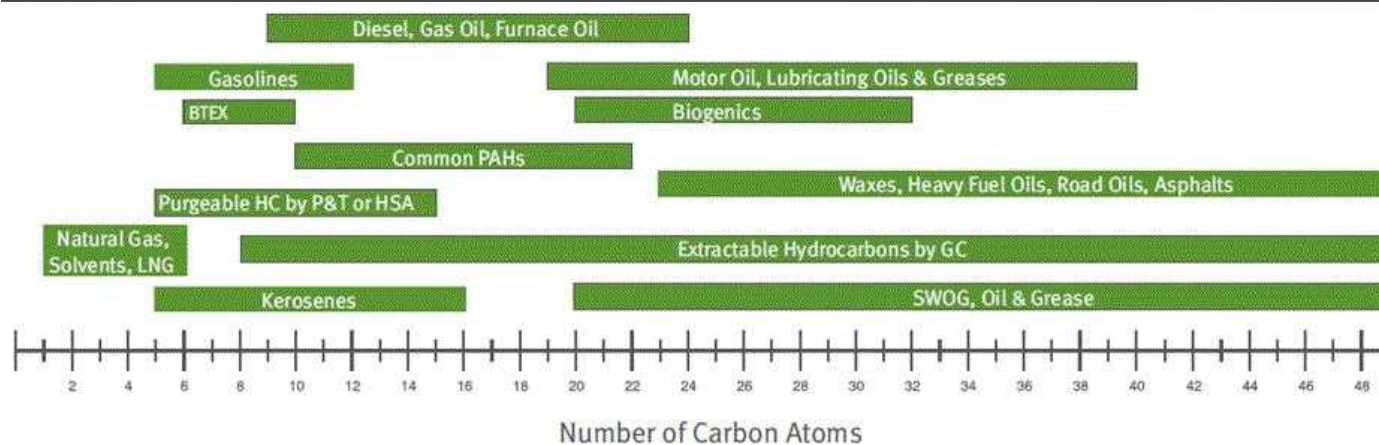
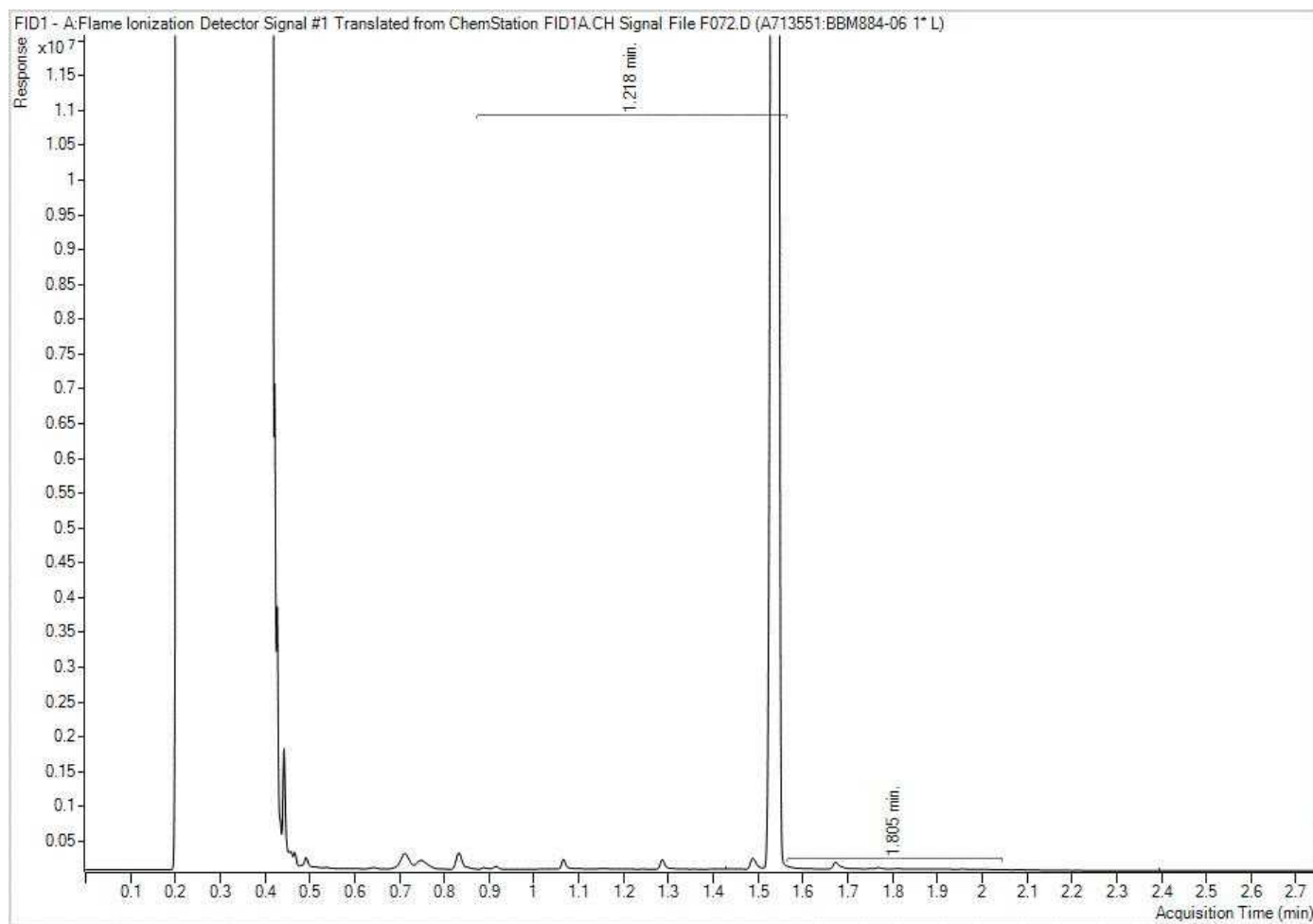
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



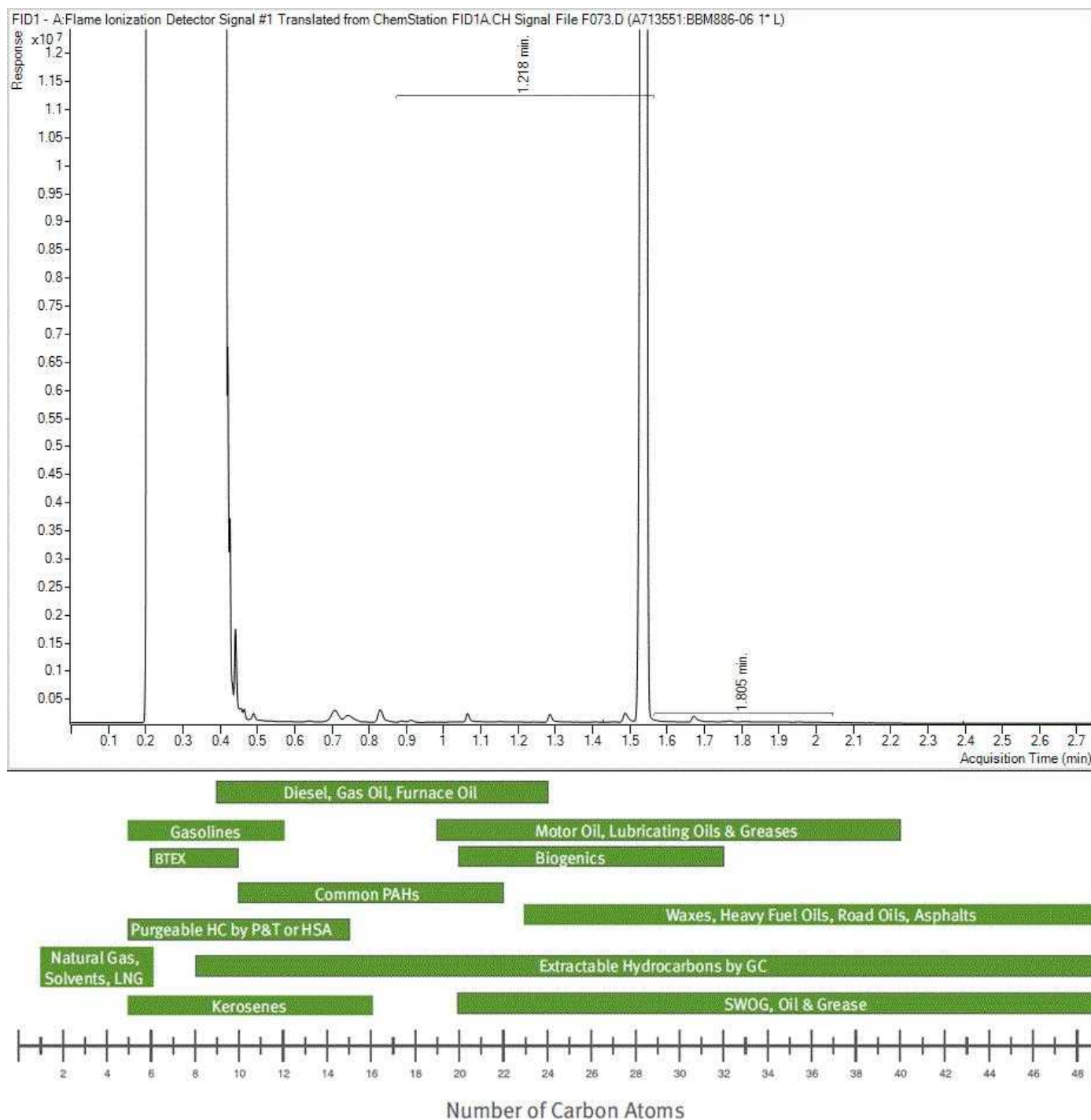
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640-1
Your Project #: 11222680-15.1
Site#: LEACHATE WATER
Site Location: NEW LANDFILL
Your C.O.C. #: 671452-01-01

Report Date: 2022/09/19

Report #: R3234318

Version: 1 - Final

CERTIFICATE OF ANALYSIS**BUREAU VERITAS JOB #: C268889****Received: 2022/09/09, 10:30**

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	3	N/A	2022/09/13	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	3	2022/09/10	2022/09/15	BBY6SOP-00045	SM 23 5210 B m
Chloride/Sulphate by Auto Colourimetry	3	N/A	2022/09/12	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO ₄ -E m
COD by Colorimeter	3	N/A	2022/09/13	BBY6SOP-00024	SM 23 5220 D m
Conductivity @25C	3	N/A	2022/09/13	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H ₂ S) (1)	3	N/A	2022/09/14		Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	3	N/A	2022/09/14	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	3	N/A	2022/09/12	BBY WI-00033	Auto Calc
Mercury (Total) by CV	3	2022/09/12	2022/09/12	AB SOP-00084	BCMOE BCLM Oct2013 m
ICP-OES Dissolved Metals in Water (2)	3	N/A	2022/09/12	BBY7SOP-00018	EPA 6010d m
EPH in Water when PAH required	3	2022/09/13	2022/09/13	BBY8SOP-00029	BCMOE BCLM Sep2017 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	3	2022/09/09	2022/09/15	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	3	2022/09/13	2022/09/14	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	3	N/A	2022/09/12	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate + Nitrite (N)	3	N/A	2022/09/10	BBY6SOP-00010	SM 23 4500-NO ₃ -I m
Nitrite (N) by CFA	3	N/A	2022/09/10	BBY6SOP-00010	SM 23 4500-NO ₃ -I m
Nitrogen - Nitrate (as N)	3	N/A	2022/09/12	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	3	2022/09/13	2022/09/14	BBY8SOP-00021	BCMOE BCLM Jul2017m
Filter and HNO ₃ Preserve for Metals	3	N/A	2022/09/09	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (3)	3	N/A	2022/09/10	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	3	N/A	2022/09/14	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Dissolved Solids (Filt. Residue)	3	2022/09/13	2022/09/14	BBY6SOP-00033	SM 23 2540 C m
EPH less PAH in Water by GC/FID (4)	3	N/A	2022/09/15	BBY WI-00033	Auto Calc
Total Suspended Solids (NFR)	3	2022/09/14	2022/09/15	BBY6SOP-00034	SM 23 2540 D m
Field pH	3	N/A	2022/09/09		
Field Temperature	3	N/A	2022/09/09		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.



Attention: Aïresse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640-1
Your Project #: 11222680-15.1
Site#: LEACHATE WATER
Site Location: NEW LANDFILL
Your C.O.C. #: 671452-01-01

Report Date: 2022/09/19

Report #: R3234318

Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C268889

Received: 2022/09/09, 10:30

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.

(3) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

(4) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Thomas Pinchin, Customer Solutions Representative

Email: Thomas.Pinchin@bureauveritas.com

Phone# (604) 734 7276

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU
VERITAS

Bureau Veritas Job #: C268889

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BBM785	BBM785			
Sampling Date		2022/09/08 09:15	2022/09/08 09:15			
COC Number		671452-01-01	671452-01-01			
	UNITS	WL-11222680-080922- CXW-01	WL-11222680-080922- CXW-01 Lab-Dup	RDL	MDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	0.0420	N/A	0.0050	0.0050	A711114
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	78.8	N/A	0.50	0.50	A710609
Nitrate (N)	mg/L	<0.020	N/A	0.020	N/A	A709815
Sulphide (as H2S)	mg/L	0.044	N/A	0.0020	N/A	A710488
Demand Parameters						
Biochemical Oxygen Demand	mg/L	3.4	N/A	2.0	N/A	A710276
Chemical Oxygen Demand	mg/L	29	N/A	10	10	A713543
Field Parameters						
Field pH	pH	6.92	N/A	N/A	N/A	ONSITE
Field Temperature	°C	17.08	N/A	N/A	N/A	ONSITE
Misc. Inorganics						
Conductivity	uS/cm	4000	N/A	2.0	N/A	A713199
Total Dissolved Solids	mg/L	360	N/A	10	N/A	A714216
Total Suspended Solids	mg/L	24	N/A	1.0	N/A	A715200
Anions						
Alkalinity (PP as CaCO3)	mg/L	59	N/A	1.0	N/A	A713198
Alkalinity (Total as CaCO3)	mg/L	1500	N/A	1.0	N/A	A713198
Bicarbonate (HCO3)	mg/L	1600	N/A	1.0	N/A	A713198
Carbonate (CO3)	mg/L	71	N/A	1.0	N/A	A713198
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	N/A	A713198
Total Sulphide	mg/L	0.041	0.039	0.0018	N/A	A715475
Chloride (Cl)	mg/L	28	N/A	1.0	N/A	A712647
Sulphate (SO4)	mg/L	730	N/A	25	N/A	A712647
Nutrients						
Total Ammonia (N)	mg/L	0.31	N/A	0.015	0.0040	A712955
Orthophosphate (P)	mg/L	0.16	N/A	0.0030	0.0030	A711120
Nitrate plus Nitrite (N)	mg/L	0.035	N/A	0.020	0.020	A711113
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						

**RESULTS OF CHEMICAL ANALYSES OF WATER**

Bureau Veritas ID		BBM786	BBM787			
Sampling Date		2022/09/08 11:25	2022/09/08 11:30			
COC Number		671452-01-01	671452-01-01			
	UNITS	WL-11222680-080922- CXW-02	WL-11222680-080922- CXW-03	RDL	MDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	0.131	0.150	0.0050	0.0050	A711114
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	1660	1670	0.50	0.50	A710609
Nitrate (N)	mg/L	0.376	0.351	0.020	N/A	A709815
Sulphide (as H2S)	mg/L	12	12	0.19	N/A	A710488
Demand Parameters						
Biochemical Oxygen Demand	mg/L	21	20	3.0	N/A	A710276
Chemical Oxygen Demand	mg/L	297	302	10	10	A713543
Field Parameters						
Field pH	pH	7.19	7.19	N/A	N/A	ONSITE
Field Temperature	°C	19.30	19.30	N/A	N/A	ONSITE
Misc. Inorganics						
Conductivity	uS/cm	4000	4000	2.0	N/A	A713199
Total Dissolved Solids	mg/L	3500 (1)	3500 (1)	13	N/A	A714216
Total Suspended Solids	mg/L	9.0 (1)	11 (1)	2.5	N/A	A715200
Anions						
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	1.0	N/A	A713198
Alkalinity (Total as CaCO3)	mg/L	710	710	1.0	N/A	A713198
Bicarbonate (HCO3)	mg/L	870	870	1.0	N/A	A713198
Carbonate (CO3)	mg/L	<1.0	<1.0	1.0	N/A	A713198
Hydroxide (OH)	mg/L	<1.0	<1.0	1.0	N/A	A713198
Total Sulphide	mg/L	11 (2)	12 (3)	0.18	N/A	A714873
Chloride (Cl)	mg/L	240	240	5.0	N/A	A712647
RDL = Reportable Detection Limit N/A = Not Applicable (1) RDL raised due to high concentration of solids in the sample. (2) Detection limits raised due to sample matrix. Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely. (3) Detection limits raised due to sample matrix. Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.						



RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BBM786	BBM787			
Sampling Date		2022/09/08 11:25	2022/09/08 11:30			
COC Number		671452-01-01	671452-01-01			
	UNITS	WL-11222680-080922- CXW-02	WL-11222680-080922- CXW-03	RDL	MDL	QC Batch
Sulphate (SO4)	mg/L	1300	1300	25	N/A	A712647
Nutrients						
Total Ammonia (N)	mg/L	24	24	0.38	0.10	A712955
Orthophosphate (P)	mg/L	0.067	0.065	0.0030	0.0030	A711120
Nitrate plus Nitrite (N)	mg/L	0.507	0.501	0.020	0.020	A711113
RDL = Reportable Detection Limit						
N/A = Not Applicable						



BUREAU
VERITAS

Bureau Veritas Job #: C268889

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BBM785	BBM786	BBM787			
Sampling Date		2022/09/08 09:15	2022/09/08 11:25	2022/09/08 11:30			
COC Number		671452-01-01	671452-01-01	671452-01-01			
	UNITS	WL-11222680-080922- CXW-01	WL-11222680-080922- CXW-02	WL-11222680-080922- CXW-03	RDL	MDL	QC Batch
Polycyclic Aromatics							
Naphthalene	ug/L	<0.10	1.5	1.6	0.10	0.050	A713548
Acenaphthene	ug/L	<0.050	0.25	0.25	0.050	0.050	A713548
Fluorene	ug/L	<0.050	0.13	0.13	0.050	0.050	A713548
Phenanthrene	ug/L	<0.050	0.11	0.11	0.050	0.050	A713548
Anthracene	ug/L	<0.010	0.013	0.012	0.010	0.010	A713548
Acridine	ug/L	<0.050	0.068	0.069	0.050	0.050	A713548
Fluoranthene	ug/L	<0.020	0.031	0.036	0.020	0.020	A713548
Pyrene	ug/L	<0.020	0.028	0.033	0.020	0.020	A713548
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	0.010	0.010	A713548
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	0.0050	0.0050	A713548
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	80	71	73	N/A	N/A	A713548
D8-ACENAPHTHYLENE (sur.)	%	78	75	75	N/A	N/A	A713548
D8-NAPHTHALENE (sur.)	%	69	68	69	N/A	N/A	A713548
TERPHENYL-D14 (sur.)	%	64	58	59	N/A	N/A	A713548
RDL = Reportable Detection Limit							
N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C268889

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BBM785			BBM786	BBM787			
Sampling Date		2022/09/08 09:15			2022/09/08 11:25	2022/09/08 11:30			
COC Number		671452-01-01			671452-01-01	671452-01-01			
	UNITS	WL-11222680-080922- CXW-01	RDL	MDL	WL-11222680-080922- CXW-02	WL-11222680-080922- CXW-03	RDL	MDL	QC Batch

Dissolved Metals by ICP									
Dissolved Calcium (Ca)	mg/L	19.3	0.050	0.050	532	537	0.50	0.50	A712276
Dissolved Magnesium (Mg)	mg/L	7.41	0.050	0.050	80.9	80.5	0.050	0.050	A712276

RDL = Reportable Detection Limit



BUREAU
VERITAS

Bureau Veritas Job #: C268889

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

TOTAL PETROLEUM HYDROCARBONS (WATER)

Bureau Veritas ID		BBM785	BBM786	BBM787			
Sampling Date		2022/09/08 09:15	2022/09/08 11:25	2022/09/08 11:30			
COC Number		671452-01-01	671452-01-01	671452-01-01			
	UNITS	WL-11222680-080922- CXW-01	WL-11222680-080922- CXW-02	WL-11222680-080922- CXW-03	RDL	MDL	QC Batch
Calculated Parameters							
LEPH (C10-C19 less PAH)	mg/L	<0.20	0.24	0.24	0.20	0.20	A709883
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	0.20	0.20	A709883
Ext. Pet. Hydrocarbon							
EPH (C10-C19)	mg/L	<0.20	0.24	0.24	0.20	0.20	A713551
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	0.20	0.20	A713551
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	88	74	76	N/A	N/A	A713551
RDL = Reportable Detection Limit							
N/A = Not Applicable							



BUREAU
VERITAS

Bureau Veritas Job #: C268889

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

MISCELLANEOUS (WATER)

Bureau Veritas ID		BBM785	BBM786	BBM787			
Sampling Date		2022/09/08 09:15	2022/09/08 11:25	2022/09/08 11:30			
COC Number		671452-01-01	671452-01-01	671452-01-01			
	UNITS	WL-11222680-080922- CXW-01	WL-11222680-080922- CXW-02	WL-11222680-080922- CXW-03	RDL	MDL	QC Batch

Calculated Parameters							
Total Un-ionized Hydrogen Sulfide as S	mg/L	0.023	4.1	4.3	0.0050	0.0050	A710608
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	0.024	4.4	4.5	0.0050	0.0050	A710608
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C268889

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BBM785			BBM786	BBM787			
Sampling Date		2022/09/08 09:15			2022/09/08 11:25	2022/09/08 11:30			
COC Number		671452-01-01			671452-01-01	671452-01-01			
	UNITS	WL-11222680-080922- CXW-01	RDL	MDL	WL-11222680-080922- CXW-02	WL-11222680-080922- CXW-03	RDL	MDL	QC Batch

Elements									
Total Mercury (Hg)	ug/L	<0.019 (1)	0.019	0.019	<0.019 (1)	<0.019 (1)	0.019	0.019	A711928
Total Metals by ICPMS									
Total Aluminum (Al)	ug/L	1630	15	0.15	280	320	30	0.30	A714600
Total Antimony (Sb)	ug/L	3.4	2.5	0.010	<5.0	<5.0	5.0	0.020	A714600
Total Arsenic (As)	ug/L	91.1	0.50	0.050	5.1	4.8	1.0	0.10	A714600
Total Barium (Ba)	ug/L	22.2	5.0	0.010	161	151	10	0.020	A714600
Total Beryllium (Be)	ug/L	<0.50	0.50	0.015	<1.0	<1.0	1.0	0.030	A714600
Total Bismuth (Bi)	ug/L	<5.0	5.0	0.0050	<10	<10	10	0.010	A714600
Total Boron (B)	ug/L	652	250	250	17600	16800	500	500	A714600
Total Cadmium (Cd)	ug/L	<0.050	0.050	0.010	<0.10	<0.10	0.10	0.020	A714600
Total Chromium (Cr)	ug/L	<5.0	5.0	0.10	13	12	10	0.20	A714600
Total Cobalt (Co)	ug/L	1.7	1.0	1.0	5.3	4.0	2.0	2.0	A714600
Total Copper (Cu)	ug/L	7.8	2.5	0.15	<5.0	<5.0	5.0	0.30	A714600
Total Iron (Fe)	ug/L	1200	50	3.5	1600	1640	100	7.0	A714600
Total Lead (Pb)	ug/L	2.9	1.0	0.0050	<2.0	<2.0	2.0	0.010	A714600
Total Lithium (Li)	ug/L	95	10	10	<20	<20	20	20	A714600
Total Manganese (Mn)	ug/L	289	5.0	0.15	8830	8370	10	0.30	A714600
Total Molybdenum (Mo)	ug/L	365	5.0	0.010	<10	<10	10	0.020	A714600
Total Nickel (Ni)	ug/L	<5.0	5.0	0.050	15	15	10	0.10	A714600
Total Phosphorus (P)	ug/L	180	50	5.0	496	474	100	10	A714600
Total Selenium (Se)	ug/L	0.68	0.50	0.030	<1.0	<1.0	1.0	0.060	A714600
Total Silicon (Si)	ug/L	24500	500	1.5	21200	20100	1000	3.0	A714600
Total Silver (Ag)	ug/L	<0.10	0.10	0.010	<0.20	<0.20	0.20	0.020	A714600
Total Strontium (Sr)	ug/L	400	5.0	0.010	2840	2750	10	0.020	A714600
Total Thallium (Tl)	ug/L	<0.050	0.050	0.050	<0.10	<0.10	0.10	0.10	A714600
Total Tin (Sn)	ug/L	<25	25	0.025	<50	<50	50	0.050	A714600
Total Titanium (Ti)	ug/L	26	25	1.5	<50	<50	50	3.0	A714600
Total Uranium (U)	ug/L	160	0.50	0.0050	<1.0	<1.0	1.0	0.010	A714600
Total Vanadium (V)	ug/L	<25	25	0.10	<50	<50	50	0.20	A714600

RDL = Reportable Detection Limit

(1) Detection limit raised based on sample volume used. Mercury sample analyzed using the HDPE container and nitric acid preservative, these non-conformances can cause stability and high or low biases, results for this test are qualified.



CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BBM785			BBM786	BBM787			
Sampling Date		2022/09/08 09:15			2022/09/08 11:25	2022/09/08 11:30			
COC Number		671452-01-01			671452-01-01	671452-01-01			
	UNITS	WL-11222680-080922- CXW-01	RDL	MDL	WL-11222680-080922- CXW-02	WL-11222680-080922- CXW-03	RDL	MDL	QC Batch
Total Zinc (Zn)	ug/L	29	25	0.25	<50	<50	50	0.50	A714600
Total Zirconium (Zr)	ug/L	3.24	0.50	0.040	3.0	3.0	1.0	0.080	A714600
Total Calcium (Ca)	mg/L	18.6	0.25	0.0050	483	463	0.50	0.010	A709812
Total Magnesium (Mg)	mg/L	8.30	0.25	0.0025	85.2	79.9	0.50	0.0050	A709812
Total Potassium (K)	mg/L	3.05	0.25	0.010	61.0	58.0	0.50	0.020	A709812
Total Sodium (Na)	mg/L	964	0.25	0.0050	319	305	0.50	0.010	A709812
Total Sulphur (S)	mg/L	240	15	5.0	414	396	30	10	A709812
RDL = Reportable Detection Limit									



**BUREAU
VERITAS**

Bureau Veritas Job #: C268889

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

GENERAL COMMENTS

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C268889

Report Date: 2022/09/19

QUALITY ASSURANCE REPORT

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A713548	D10-ANTHRACENE (sur.)	2022/09/14			95	50 - 140	81	%		
A713548	D8-ACENAPHTHYLENE (sur.)	2022/09/14			90	50 - 140	78	%		
A713548	D8-NAPHTHALENE (sur.)	2022/09/14			81	50 - 140	66	%		
A713548	TERPHENYL-D14 (sur.)	2022/09/14			81	50 - 140	62	%		
A713551	O-TERPHENYL (sur.)	2022/09/13			82	60 - 140	90	%		
A710276	Biochemical Oxygen Demand	2022/09/15			88	85 - 115	<2.0	mg/L	11 (1)	20
A711113	Nitrate plus Nitrite (N)	2022/09/10	102	80 - 120	108	80 - 120	<0.020	mg/L	1.1 (1)	25
A711114	Nitrite (N)	2022/09/10	103	80 - 120	105	80 - 120	<0.0050	mg/L	1.7 (1)	20
A711120	Orthophosphate (P)	2022/09/10	95	80 - 120	92	80 - 120	<0.0030	mg/L	NC (1)	20
A711928	Total Mercury (Hg)	2022/09/12	86	80 - 120	97	80 - 120	<0.0019	ug/L	NC (1)	20
A712276	Dissolved Calcium (Ca)	2022/09/12	104	80 - 120	104	80 - 120	<0.050	mg/L	0.34 (1)	20
A712276	Dissolved Magnesium (Mg)	2022/09/12	102	80 - 120	98	80 - 120	<0.050	mg/L	0.65 (1)	20
A712647	Chloride (Cl)	2022/09/12	113	80 - 120	104	80 - 120	<1.0	mg/L	NC (1)	20
A712647	Sulphate (SO4)	2022/09/12	104	80 - 120	100	80 - 120	<1.0	mg/L	1.9 (1)	20
A712955	Total Ammonia (N)	2022/09/12	100	80 - 120	104	80 - 120	<0.015	mg/L	NC (1)	20
A713198	Alkalinity (PP as CaCO3)	2022/09/13					<1.0	mg/L	3.3 (1)	20
A713198	Alkalinity (Total as CaCO3)	2022/09/13	NC	80 - 120	93	80 - 120	<1.0	mg/L	0.60 (1)	20
A713198	Bicarbonate (HCO3)	2022/09/13					<1.0	mg/L	0.70 (1)	20
A713198	Carbonate (CO3)	2022/09/13					<1.0	mg/L	3.3 (1)	20
A713198	Hydroxide (OH)	2022/09/13					<1.0	mg/L	NC (1)	20
A713199	Conductivity	2022/09/13			102	80 - 120	<2.0	uS/cm	0.92 (1)	10
A713543	Chemical Oxygen Demand	2022/09/13	101	80 - 120	102	80 - 120	<10	mg/L	11 (1)	20
A713548	Acenaphthene	2022/09/14			81	50 - 140	<0.050	ug/L	0.73 (1)	40
A713548	Acridine	2022/09/14			96	50 - 140	<0.050	ug/L	NC (1)	40
A713548	Anthracene	2022/09/14			87	50 - 140	<0.010	ug/L	NC (1)	40
A713548	Benzo(a)anthracene	2022/09/14			90	50 - 140	<0.010	ug/L	NC (1)	40
A713548	Benzo(a)pyrene	2022/09/14			86	50 - 140	<0.0050	ug/L	NC (1)	40
A713548	Fluoranthene	2022/09/14			50	50 - 140	<0.020	ug/L	NC (1)	40
A713548	Fluorene	2022/09/14			84	50 - 140	<0.050	ug/L	NC (1)	40
A713548	Naphthalene	2022/09/14			66	50 - 140	<0.10	ug/L	NC (1)	40
A713548	Phenanthrene	2022/09/14			84	50 - 140	<0.050	ug/L	NC (1)	40



BUREAU
VERITAS

Bureau Veritas Job #: C268889

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A713548	Pyrene	2022/09/14			70	50 - 140	<0.020	ug/L	NC (1)	40
A713551	EPH (C10-C19)	2022/09/13			99	70 - 130	<0.20	mg/L	NC (1)	30
A713551	EPH (C19-C32)	2022/09/13			102	70 - 130	<0.20	mg/L	NC (1)	30
A714216	Total Dissolved Solids	2022/09/14	102	80 - 120	102	80 - 120	<10	mg/L	3.4 (1)	20
A714600	Total Aluminum (Al)	2022/09/14	100	80 - 120	104	80 - 120	<3.0	ug/L	13 (1)	20
A714600	Total Antimony (Sb)	2022/09/14	104	80 - 120	103	80 - 120	<0.50	ug/L	NC (1)	20
A714600	Total Arsenic (As)	2022/09/14	107	80 - 120	104	80 - 120	<0.10	ug/L	NC (1)	20
A714600	Total Barium (Ba)	2022/09/14	98	80 - 120	102	80 - 120	<1.0	ug/L	2.7 (1)	20
A714600	Total Beryllium (Be)	2022/09/14	106	80 - 120	104	80 - 120	<0.10	ug/L	NC (1)	20
A714600	Total Bismuth (Bi)	2022/09/14	95	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A714600	Total Boron (B)	2022/09/14	NC	80 - 120	106	80 - 120	<50	ug/L	1.0 (1)	20
A714600	Total Cadmium (Cd)	2022/09/14	101	80 - 120	101	80 - 120	<0.010	ug/L	NC (1)	20
A714600	Total Chromium (Cr)	2022/09/14	100	80 - 120	102	80 - 120	<1.0	ug/L	NC (1)	20
A714600	Total Cobalt (Co)	2022/09/14	98	80 - 120	101	80 - 120	<0.20	ug/L	8.6 (1)	20
A714600	Total Copper (Cu)	2022/09/14	94	80 - 120	98	80 - 120	<0.50	ug/L	NC (1)	20
A714600	Total Iron (Fe)	2022/09/14	102	80 - 120	103	80 - 120	<10	ug/L	NC (1)	20
A714600	Total Lead (Pb)	2022/09/14	98	80 - 120	103	80 - 120	<0.20	ug/L	NC (1)	20
A714600	Total Lithium (Li)	2022/09/14	103	80 - 120	105	80 - 120	<2.0	ug/L	2.4 (1)	20
A714600	Total Manganese (Mn)	2022/09/14	99	80 - 120	101	80 - 120	<1.0	ug/L	2.9 (1)	20
A714600	Total Molybdenum (Mo)	2022/09/14	111	80 - 120	105	80 - 120	<1.0	ug/L	NC (1)	20
A714600	Total Nickel (Ni)	2022/09/14	96	80 - 120	99	80 - 120	<1.0	ug/L	5.0 (1)	20
A714600	Total Phosphorus (P)	2022/09/14	101	80 - 120	100	80 - 120	<10	ug/L		
A714600	Total Selenium (Se)	2022/09/14	102	80 - 120	100	80 - 120	<0.10	ug/L	NC (1)	20
A714600	Total Silicon (Si)	2022/09/14	114	80 - 120	112	80 - 120	<100	ug/L	2.9 (1)	20
A714600	Total Silver (Ag)	2022/09/14	97	80 - 120	100	80 - 120	<0.020	ug/L	NC (1)	20
A714600	Total Strontium (Sr)	2022/09/14	NC	80 - 120	100	80 - 120	<1.0	ug/L	2.5 (1)	20
A714600	Total Thallium (Tl)	2022/09/14	97	80 - 120	99	80 - 120	<0.010	ug/L	NC (1)	20
A714600	Total Tin (Sn)	2022/09/14	105	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
A714600	Total Titanium (Ti)	2022/09/14	107	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
A714600	Total Uranium (U)	2022/09/14	105	80 - 120	103	80 - 120	<0.10	ug/L	NC (1)	20
A714600	Total Vanadium (V)	2022/09/14	102	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20



BUREAU
VERITAS

Bureau Veritas Job #: C268889

Report Date: 2022/09/19

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A714600	Total Zinc (Zn)	2022/09/14	100	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A714600	Total Zirconium (Zr)	2022/09/14	101	80 - 120	97	80 - 120	<0.10	ug/L	NC (1)	20
A714873	Total Sulphide	2022/09/14	91	80 - 120	82	80 - 120	<0.0018	mg/L	NC (1)	20
A715200	Total Suspended Solids	2022/09/15	96	80 - 120	102	80 - 120	<1.0	mg/L	14 (1)	20
A715475	Total Sulphide	2022/09/14	108	80 - 120	88	80 - 120	<0.0018	mg/L	4.8 (2)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Duplicate Parent ID

(2) Duplicate Parent ID [BBM785-08]



BUREAU
VERITAS

Bureau Veritas Job #: C268889

Report Date: 2022/09/19

GHD Limited

Client Project #: 11222680-15.1

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist



Bureau Veritas Proprietary Software
Logiciel Propriétaire de Bureau Veritas

Automated Statchk

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Bureau Veritas
4805 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel (604) 734 7276 Toll-free 800-563-6266 Fax (604) 731 2386 www.bvna.com

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C268889_COC

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Bottle Order #:



671452

Project Manager

Thomas Pinchin

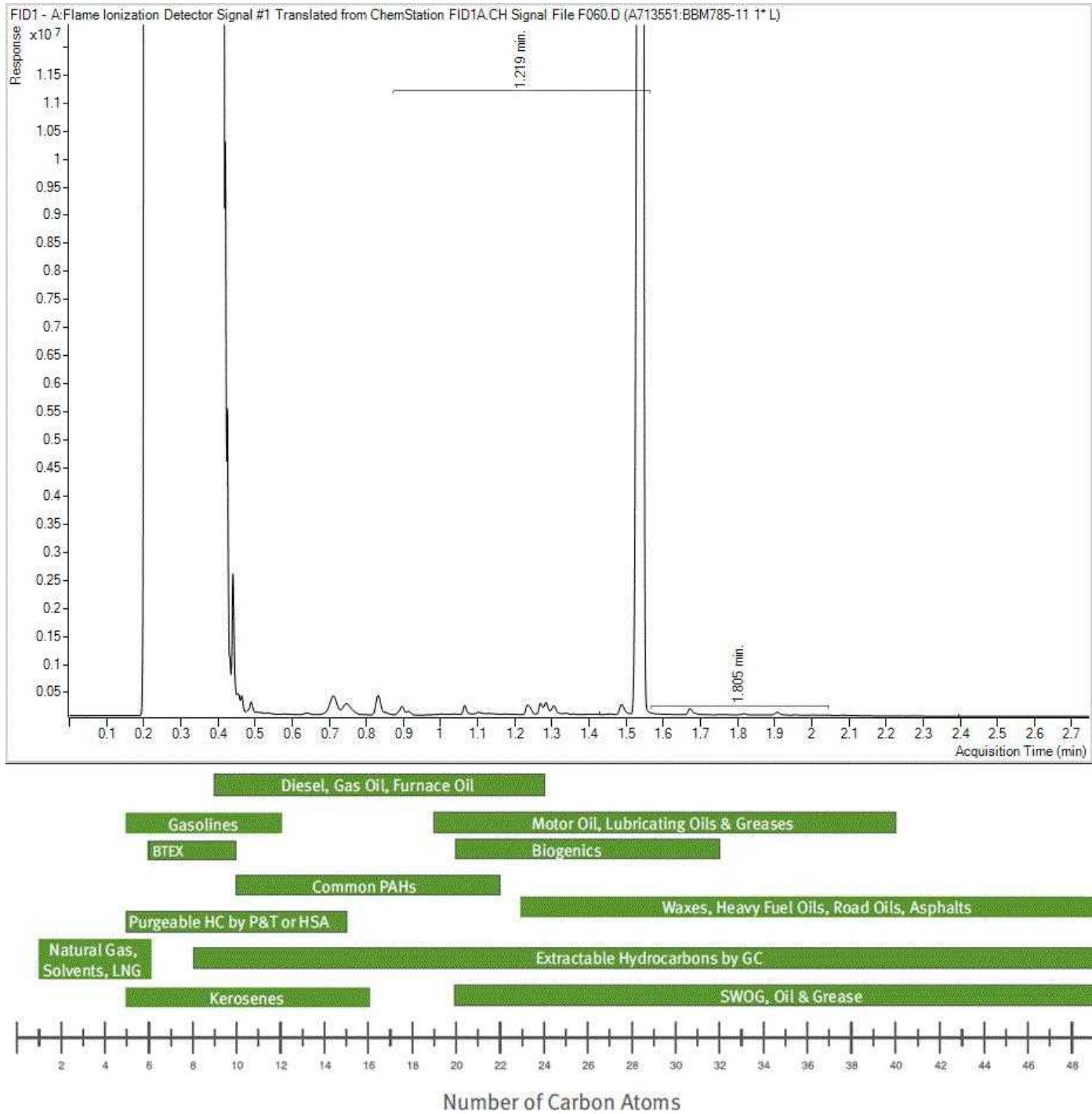
INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name	GHD Ltd.	Quotation #	C10010
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #	735-002640
Address	455 PHILLIP STREET WATERLOO ON N2L 3X2	Address		Project #	11222680
Phone	(519) 884-0510	Phone		Project Name	Upland Landfill
Fax	(519) 725-1394	Fax		Site #	Leachate Water
Email	APinvoices-735@ghd.com	Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Sampled By	CXW

Regulatory Criteria:		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required:			
☒ CSR ☐ CCME ☐ BC Water Quality ☐ Other		Filtered & preserved as needed		Media Field Filtered? (Y/N) Conductivity, Cl, SO4, NO2, NO3, N-N, PO4, TDS, TSS, Sp. Alk, Cl, Fluoride, Sph. Alk, Total Sulphide, Total H2S, Un-ionized (as H2S) - based on total Ammonia-N (Total) Total Metals with CV Hg (NO HARDNESS) Biochemical Oxygen Demand COD Dissolved Hardness LEPH/HEPH with subtracted PAHs Field pH Field Temperature										Regular (Standard) TAT: (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐ Rush Confirmation Number: (call lab for #)			
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS														# of Bottles		Comments	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix													
1	NL-11222680-080922-CXW-01	Sept 8, 2022	09:15	Leachate	Y	X	X	X	X	X	X	X	X	6.92	17.08	11	
2	NL-11222680-080922-CXW-02		11:25											7.19	17.30		
3	NL-11222680-080922-CXW-03		11:30											7.19	17.30		
4																	
5																	
6																	
7																	
8																	
9																	
10																	
* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# jars used and not submitted		Lab Use Only		Time Sensitive		Temperature (°C) on Receipt		Custody Seal Intact on Cooler?	
[Signature]		22/09/2022	09:55	[Signature]		22/09/2022	10:30					☐		4, 4, 4		☐ Yes ☒ No	
* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS.																	
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.																	

Bureau Veritas Canada (2019) Inc.

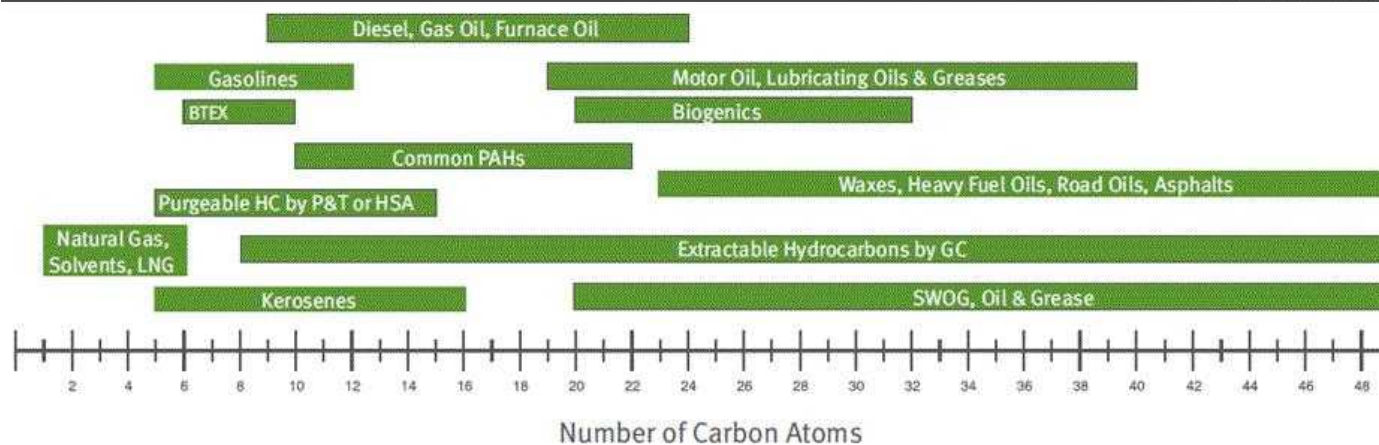
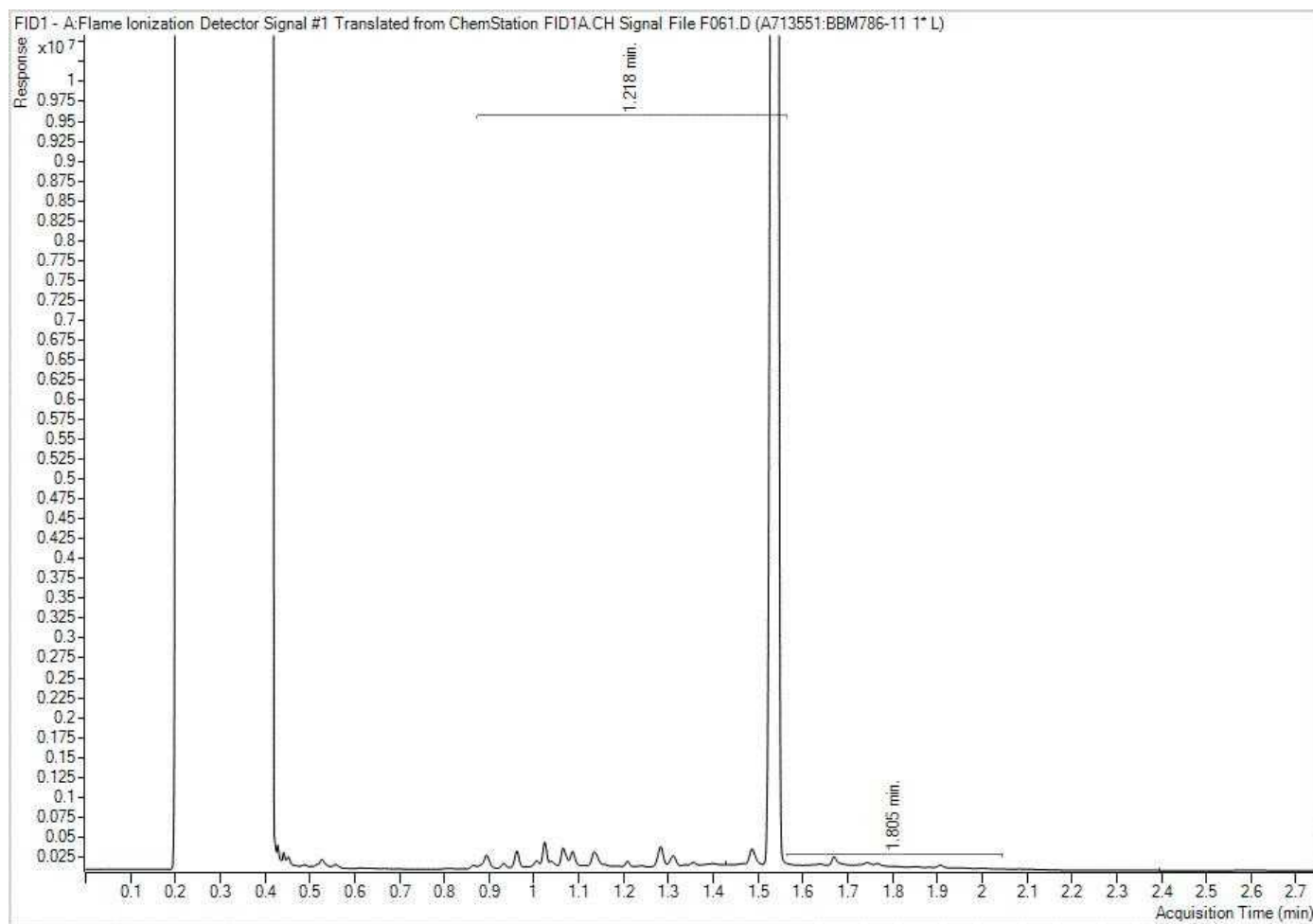
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EPH in Water when PAH required Chromatogram



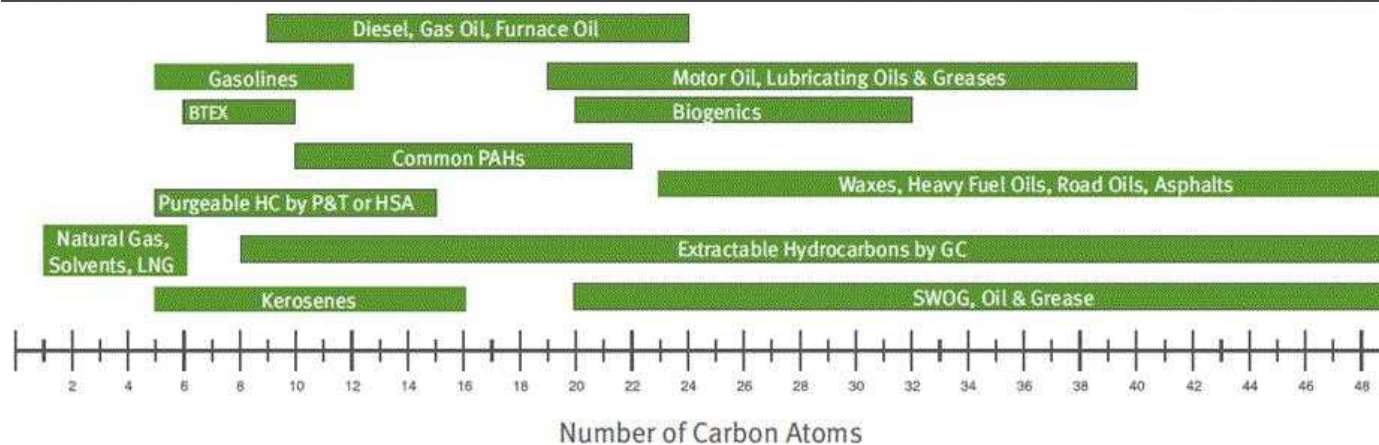
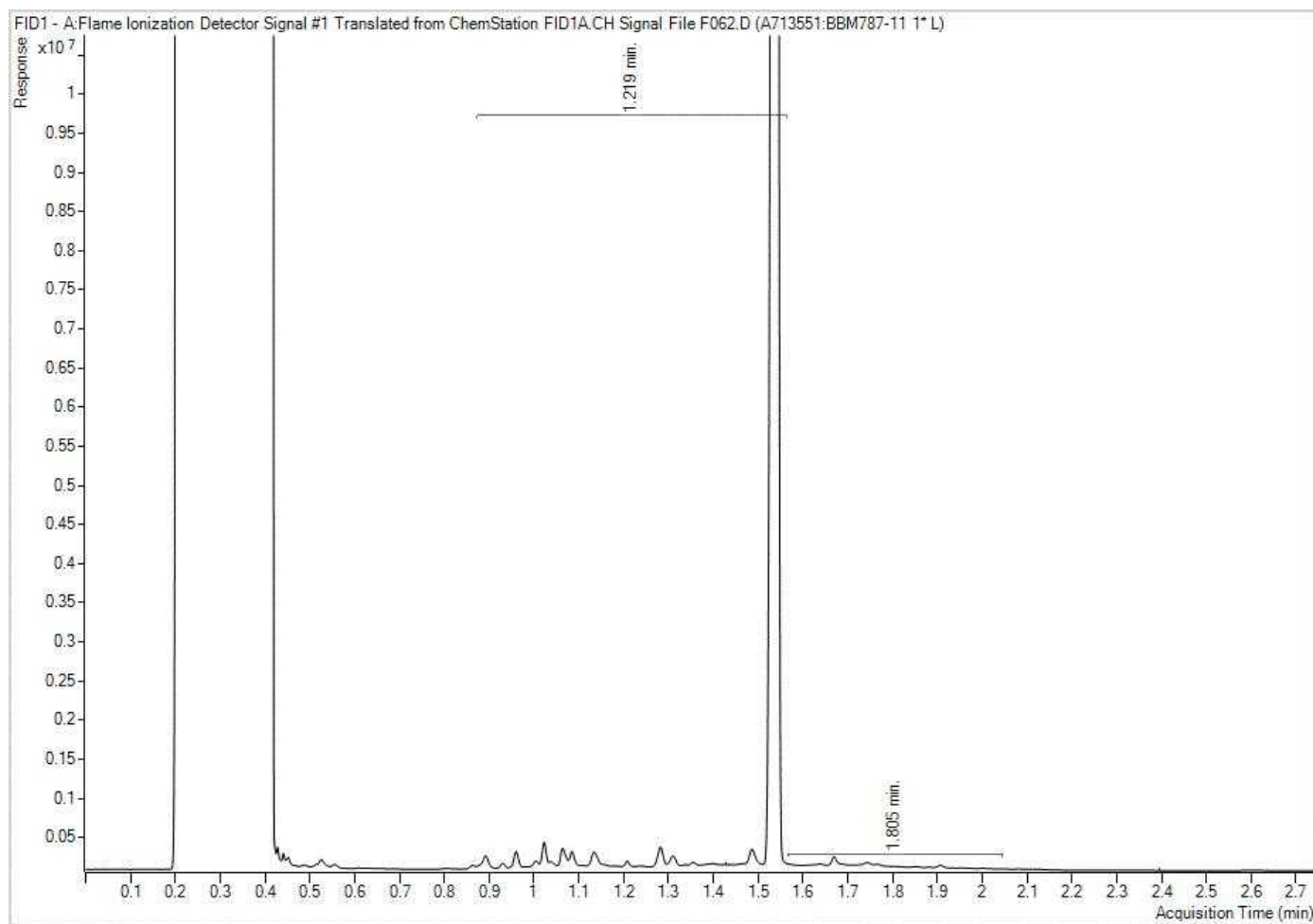
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Location	Date Time	Sample Name	Matrix	Type	Sampler	Site Name	Facility ID	Field pH (L+L)	Conductivity	Conductivity Unit	Sample Temperature	Sample Temperature Unit	Turbidity (NTU)	ORP	ORP Units	Dissolved Oxygen (DO)	DO Units	Volume of Water Purged	Volume Purged Units	Flow Rate Units	Event Name	Sampling Company	Sample Observation
MW11-19	11/16/2022 10:17:00	WG-11222680-161122-CXW-01	WG	N	CXW	Upland Landfill	1088877000	7.32	288	uS/cm	13.05	deg C	1000	257	millivolt	6.1	mg/L	10	L	ml/min	202208-Q3W6	GHD	Slightly, no odour
MW10-17	11/16/2022 11:30:00	WG-11222680-161122-CXW-02	WG	N	CXW	Upland Landfill	1088877000	7.55	111	uS/cm	11.84	deg C	4.0	272	millivolt	3.38	mg/L	10	L	ml/min	202208-Q3W6	GHD	Clear, no odour
MW10-17	11/16/2022 11:32:00	WG-11222680-161122-CXW-03	WG	FD	CXW	Upland Landfill	1088877000	7.55	111	uS/cm	11.84	deg C	4.0	272	millivolt	3.38	mg/L	10	L	ml/min	202208-Q3W6	GHD	Clear, no odour
MW12-22	11/16/2022 12:20:00	WG-11222680-161122-04	WG	N	CXW	Upland Landfill	1088877000	7.61	174	uS/cm	9.70	deg C	10.2	293	millivolt	10.57	mg/L	10	L	ml/min	202208-Q3W6	GHD	Clear, no odour
MW2-14	11/16/2022 13:45:00	WG-11222680-161122-CXW-05	WG	N	CXW	Upland Landfill	1088877000	7.47	147	uS/cm	10.90	deg C	4.3	305	millivolt	6.26	mg/L	10	L	ml/min	202208-Q3W6	GHD	Clear, no odour
MW2A-16	11/16/2022 13:55:00	WG-11222680-161122-CXW-06	WG	N	CXW	Upland Landfill	1088877000	7.86	77	uS/cm	11.06	deg C	4.0	157	millivolt	4.20	mg/L	0	L	ml/min	202208-Q3W6	GHD	Clear, no odour
MW3-14	11/16/2022 14:55:00	WG-11222680-161122-CXW-07	WG	N	CXW	Upland Landfill	1088877000	7.19	97	uS/cm	9.68	deg C	4.7	200	millivolt	9.74	mg/L	5	L	ml/min	202208-Q3W6	GHD	Clear, no odour
MW1-14	11/16/2022 15:47:00	WG-11222680-161122-CXW-08	WG	N	CXW	Upland Landfill	1088877000	7.73	103	uS/cm	10.78	deg C	41.9	208	millivolt	7.83	mg/L	4	L	ml/min	202208-Q3W6	GHD	Clear, no odour
MW9-17	11/17/2022 08:25:00	WG-11222680-171122-CXW-09	WG	N	CXW	Upland Landfill	1088877000	6.36	76	uS/cm	14.02	deg C	1.8	352	millivolt	4.40	mg/L	18	L	ml/min	202208-Q3W6	GHD	Clear, no odour
MW6-17	11/17/2022 08:40:00	WG-11222680-171122-CXW-10	WG	N	CXW	Upland Landfill	1088877000	6.73	448	uS/cm	8.87	deg C	42.2	348	millivolt	10.84	mg/L	L	L	ml/min	202208-Q3W6	GHD	Sample recharge. Clear and no odour
SW15-02	11/17/2022 09:40:00	WS-11222680-171122-CXW-01	WS	N	CXW	Upland Landfill	1088877000	7.22	67	uS/cm	5.78	deg C	1.9	294	millivolt	6.28	mg/L	L	L	ml/min	202208-Q3W6	GHD	Clear, no odour, flow
East Surface Water Ditch	11/17/2022 10:35:00	DRY		N	CXW	Upland Landfill	1088877000														202208-Q3W6		
West Surface Water Ditch	11/17/2022 10:35:00	DRY		N	CXW	Upland Landfill	1088877000														202208-Q3W6		
S01-17	11/17/2022 11:46:00	WL-11222680-171122-CXW-02	WW	N	CXW	Upland Landfill	1088877000	6.80	1820	uS/cm	11.60	deg C	18.4	-68	millivolt	9.51	mg/L				202208-Q3W6	GHD	Clear but slight sulphur odour
S03-19	11/17/2022 11:56:00	Cannot Access		N	CXW	Upland Landfill	1088877000														202208-Q3W6		
TUP	11/17/2022 10:40:00	WL-11222680-171122-CXW-01	WW	N	CXW	Upland Landfill	1088877000	6.11	3040	uS/cm	4.53	deg C	48.5	-73	millivolt	10.56	mg/L	L		ml/min	202208-Q3W6	GHD	
S05-19	11/17/2022 12:00:00	DRY		N	CXW	Upland Landfill	1088877000														202208-Q3W6	GHD	
Leak Detection Pipe	11/17/2022 13:16:00	DRY		N	CXW	Upland Landfill	1088877000														202208-Q3W6	GHD	
MW8-17	11/17/2022 13:18:00	Monitor only. No sample.		N	CXW	Upland Landfill	1088877000														202208-Q3W6		
S06-21	11/17/2022 13:18:00	No Sample		N	CXW	Upland Landfill	1088877000														202208-Q3W6	GHD	
LDMP-1	11/17/2022 13:20:00	DRY		N	CXW	Upland Landfill	1088877000														202208-Q3W6		
LDMP-2	11/17/2022 13:21:00	DRY		N	CXW	Upland Landfill	1088877000														202208-Q3W6		
LDMP-3	11/17/2022 13:21:00	DRY		N	CXW	Upland Landfill	1088877000														202208-Q3W6		
LDMP-4	11/17/2022 13:21:00	No measurement		N	CXW	Upland Landfill	1088877000														202208-Q3W6		
McIvor Lake	11/17/2022 13:30:00	WS-11222680-171122-CXW-02	WS	N	CXW	Upland Landfill	1088877000	8.47	58	uS/cm	10.01	deg C	12.6	33	millivolt	8.50	mg/L	L		ml/min	202208-Q3W6	GHD	Clear, no odour, flow
MW4A-15	11/17/2022 14:21:00	No Sample		N	CXW	Upland Landfill	1088877000														202208-Q3W6	GHD	
MW4B-15	11/17/2022 14:25:00	No Sample		N	CXW	Upland Landfill	1088877000														202208-Q3W6	GHD	
Trip Blank	11/18/2022 15:33:00	TB-11222680-181122-CXW-01	WQ	TB	CXW	Upland Landfill	1088877000														202208-Q3W6		BTEX/VPH Only
Field Blank	11/18/2022 10:00:00	W-11222680-181122-01	WQ	FB	CXW	Upland Landfill	1088877000														202208-Q3W6		

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640-1
Your Project #: 11222680-15.1- UPLAND LANDFILL
Site#: SURFACE WATER
Site Location: NEW LANDFILL
Your C.O.C. #: 678155-01-01

Report Date: 2022/12/08

Report #: R3274728

Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT**BUREAU VERITAS JOB #: C291536****Received: 2022/11/19, 09:00**

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	2	N/A	2022/11/21	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	2	N/A	2022/11/21	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO ₄ -E m
Conductivity @25C	2	N/A	2022/11/21	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H ₂ S)	2	N/A	2022/11/23	BBY WI-00033	Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	2	N/A	2022/11/23	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	2	N/A	2022/11/23	BBY WI-00033	Auto Calc
Mercury (Total) by CV	2	2022/11/25	2022/11/25	AB SOP-00084	BCMOE BCLM Oct2013 m
ICP-OES Dissolved Metals in Water (2)	2	N/A	2022/11/22	BBY7SOP-00018	EPA 6010d m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	2022/11/19	2022/11/23	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	2	2022/11/23	2022/11/23	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	2	N/A	2022/11/21	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate + Nitrite (N)	2	N/A	2022/11/22	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrite (N) by CFA	2	N/A	2022/11/22	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	2	N/A	2022/11/22	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	2	N/A	2022/11/19	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (3)	2	N/A	2022/11/19	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	2	N/A	2022/11/23	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Suspended Solids (NFR)	2	2022/11/24	2022/11/25	BBY6SOP-00034	SM 23 2540 D m
Field pH	2	N/A	2022/11/19		
Field Temperature	2	N/A	2022/11/19		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.



Attention: Aïresse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-002640-1
Your Project #: 11222680-15.1- UPLAND LANDFILL
Site#: SURFACE WATER
Site Location: NEW LANDFILL
Your C.O.C. #: 678155-01-01

Report Date: 2022/12/08
Report #: R3274728
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C291536

Received: 2022/11/19, 09:00

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.

(3) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Brody Andersen, B.Sc., B.Sc., Program Specialist—Emergency Spill Response

Email: Brody.Andersen@bureauveritas.com

Phone# (780)577-7120

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Raphael Kwan, Senior Manager, BC and Yukon Regions responsible for British Columbia Environmental laboratory operations.



RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BHI247		BHI248		
Sampling Date		2022/11/17 09:40		2022/11/17 13:30		
COC Number		678155-01-01		678155-01-01		
	UNITS	WS-11222680-171122- CXW-01	QC Batch	WS-11222680-171122- CXW-02	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.0050	A806294	<0.0050	0.0050	A806294
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	23.1	A803334	16.7	0.50	A803334
Nitrate (N)	mg/L	<0.020	A803349	<0.020	0.020	A803349
Sulphide (as H2S)	mg/L	<0.0018	A803329	<0.0018	0.0018	A803329
Field Parameters						
Field pH	pH	7.22	ONSITE	8.47	N/A	ONSITE
Field Temperature	°C	5.78	ONSITE	10.01	N/A	ONSITE
Misc. Inorganics						
Conductivity	uS/cm	54	A806616	57	2.0	A806616
Total Suspended Solids	mg/L	2.3 (1)	A808685	1.4 (1)	1.2	A808685
Anions						
Alkalinity (PP as CaCO3)	mg/L	<1.0	A806613	<1.0	1.0	A806613
Alkalinity (Total as CaCO3)	mg/L	18	A806613	16	1.0	A806613
Bicarbonate (HCO3)	mg/L	22	A806613	20	1.0	A806613
Carbonate (CO3)	mg/L	<1.0	A806613	<1.0	1.0	A806613
Hydroxide (OH)	mg/L	<1.0	A806613	<1.0	1.0	A806613
Total Sulphide	mg/L	<0.0018	A807333	<0.0018	0.0018	A807333
Chloride (Cl)	mg/L	<1.0	A805382	5.9	1.0	A805382
Sulphate (SO4)	mg/L	2.4	A805382	<1.0	1.0	A805382
Nutrients						
Total Ammonia (N)	mg/L	<0.015	A804709	<0.015	0.015	A804708
Orthophosphate (P)	mg/L	<0.0030	A803440	0.0031	0.0030	A803440
Nitrate plus Nitrite (N)	mg/L	<0.020	A806292	<0.020	0.020	A806292
RDL = Reportable Detection Limit						
N/A = Not Applicable						
(1) RDL raised due to limited initial sample amount.						



BUREAU
VERITAS

Bureau Veritas Job #: C291536

Report Date: 2022/12/08

GHD Limited

Client Project #: 11222680-15.1- UPLAND LANDFILL

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BHI247	BHI247	BHI248		
Sampling Date		2022/11/17 09:40	2022/11/17 09:40	2022/11/17 13:30		
COC Number		678155-01-01	678155-01-01	678155-01-01		
	UNITS	WS-11222680-171122- CXW-01	WS-11222680-171122- CXW-01 Lab-Dup	WS-11222680-171122- CXW-02	RDL	QC Batch
Dissolved Metals by ICP						
Dissolved Calcium (Ca)	mg/L	7.90	7.79	4.77	0.050	A806255
Dissolved Magnesium (Mg)	mg/L	0.826	0.824	1.17	0.050	A806255
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						



BUREAU
VERITAS

Bureau Veritas Job #: C291536

Report Date: 2022/12/08

GHD Limited

Client Project #: 11222680-15.1- UPLAND LANDFILL

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

MISCELLANEOUS (WATER)

Bureau Veritas ID		BHI247	BHI248		
Sampling Date		2022/11/17 09:40	2022/11/17 13:30		
COC Number		678155-01-01	678155-01-01		
	UNITS	WS-11222680-171122- CXW-01	WS-11222680-171122- CXW-02	RDL	QC Batch
Calculated Parameters					
Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	0.0050	A803331
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	<0.0050	<0.0050	0.0050	A803331
RDL = Reportable Detection Limit					



BUREAU
VERITAS

Bureau Veritas Job #: C291536

Report Date: 2022/12/08

GHD Limited

Client Project #: 11222680-15.1- UPLAND LANDFILL

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI247	BHI248		
Sampling Date		2022/11/17 09:40	2022/11/17 13:30		
COC Number		678155-01-01	678155-01-01		
	UNITS	WS-11222680-171122- CXW-01	WS-11222680-171122- CXW-02	RDL	QC Batch
Elements					
Total Mercury (Hg)	ug/L	<0.0019	<0.0019	0.0019	A809424
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	397	15.0	3.0	A807127
Total Antimony (Sb)	ug/L	<0.50	<0.50	0.50	A807127
Total Arsenic (As)	ug/L	0.21	0.11	0.10	A807127
Total Barium (Ba)	ug/L	4.3	2.6	1.0	A807127
Total Beryllium (Be)	ug/L	<0.10	<0.10	0.10	A807127
Total Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	A807127
Total Boron (B)	ug/L	<50	<50	50	A807127
Total Cadmium (Cd)	ug/L	0.019	<0.010	0.010	A807127
Total Chromium (Cr)	ug/L	<1.0	<1.0	1.0	A807127
Total Cobalt (Co)	ug/L	0.21	<0.20	0.20	A807127
Total Copper (Cu)	ug/L	2.11	0.64	0.50	A807127
Total Iron (Fe)	ug/L	427	321	10	A807127
Total Lead (Pb)	ug/L	0.26	<0.20	0.20	A807127
Total Lithium (Li)	ug/L	<2.0	<2.0	2.0	A807127
Total Manganese (Mn)	ug/L	22.5	33.9	1.0	A807127
Total Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	A807127
Total Nickel (Ni)	ug/L	<1.0	<1.0	1.0	A807127
Total Phosphorus (P)	ug/L	26	12	10	A807127
Total Selenium (Se)	ug/L	<0.10	<0.10	0.10	A807127
Total Silicon (Si)	ug/L	1730	706	100	A807127
Total Silver (Ag)	ug/L	<0.020	<0.020	0.020	A807127
Total Strontium (Sr)	ug/L	12.5	16.5	1.0	A807127
Total Thallium (Tl)	ug/L	<0.010	<0.010	0.010	A807127
Total Tin (Sn)	ug/L	<5.0	<5.0	5.0	A807127
Total Titanium (Ti)	ug/L	24.5	<5.0	5.0	A807127
Total Uranium (U)	ug/L	<0.10	<0.10	0.10	A807127
Total Vanadium (V)	ug/L	<5.0	<5.0	5.0	A807127
Total Zinc (Zn)	ug/L	5.6	<5.0	5.0	A807127
Total Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	A807127
RDL = Reportable Detection Limit					



BUREAU
VERITAS

Bureau Veritas Job #: C291536

Report Date: 2022/12/08

GHD Limited

Client Project #: 11222680-15.1- UPLAND LANDFILL

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI247	BHI248		
Sampling Date		2022/11/17 09:40	2022/11/17 13:30		
COC Number		678155-01-01	678155-01-01		
	UNITS	WS-11222680-171122- CXW-01	WS-11222680-171122- CXW-02	RDL	QC Batch
Total Calcium (Ca)	mg/L	7.95	4.87	0.050	A803344
Total Magnesium (Mg)	mg/L	0.916	1.16	0.050	A803344
Total Potassium (K)	mg/L	0.099	0.164	0.050	A803344
Total Sodium (Na)	mg/L	0.810	4.24	0.050	A803344
Total Sulphur (S)	mg/L	<3.0	<3.0	3.0	A803344
RDL = Reportable Detection Limit					



BUREAU
VERITAS

Bureau Veritas Job #: C291536

Report Date: 2022/12/08

GHD Limited

Client Project #: 11222680-15.1- UPLAND LANDFILL

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

GENERAL COMMENTS

Version 2: Report reissued to remove the values for Total Hardness in Water and pH @ 25°C as per client request on 2022/12/08.

Sample BHI247 [WS-11222680-171122-CXW-01] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample BHI248 [WS-11222680-171122-CXW-02] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C291536

Report Date: 2022/12/08

QUALITY ASSURANCE REPORT

GHD Limited

Client Project #: 11222680-15.1- UPLAND LANDFILL

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A803440	Orthophosphate (P)	2022/11/19	87	80 - 120	96	80 - 120	<0.0030	mg/L	NC (1)	20
A804708	Total Ammonia (N)	2022/11/21	NC	80 - 120	100	80 - 120	<0.015	mg/L	0.082 (1)	20
A804709	Total Ammonia (N)	2022/11/21	96	80 - 120	101	80 - 120	<0.015	mg/L	NC (1)	20
A805382	Chloride (Cl)	2022/11/21	109	80 - 120	102	80 - 120	<1.0	mg/L	13 (1)	20
A805382	Sulphate (SO4)	2022/11/21	101	80 - 120	96	80 - 120	<1.0	mg/L	NC (1)	20
A806255	Dissolved Calcium (Ca)	2022/11/22	100 (2)	80 - 120	102	80 - 120	<0.050	mg/L	1.4 (3)	20
A806255	Dissolved Magnesium (Mg)	2022/11/22	102 (2)	80 - 120	100	80 - 120	<0.050	mg/L	0.19 (3)	20
A806292	Nitrate plus Nitrite (N)	2022/11/22	110	80 - 120	107	80 - 120	<0.020	mg/L	NC (1)	25
A806294	Nitrite (N)	2022/11/22	106	80 - 120	101	80 - 120	<0.0050	mg/L	NC (1)	20
A806613	Alkalinity (PP as CaCO3)	2022/11/21					<1.0	mg/L	NC (1)	20
A806613	Alkalinity (Total as CaCO3)	2022/11/21	NC	80 - 120	95	80 - 120	<1.0	mg/L	0.32 (1)	20
A806613	Bicarbonate (HCO3)	2022/11/21					<1.0	mg/L	0.32 (1)	20
A806613	Carbonate (CO3)	2022/11/21					<1.0	mg/L	NC (1)	20
A806613	Hydroxide (OH)	2022/11/21					<1.0	mg/L	NC (1)	20
A806616	Conductivity	2022/11/21			102	80 - 120	<2.0	uS/cm	0.27 (1)	10
A807127	Total Aluminum (Al)	2022/11/23	100	80 - 120	99	80 - 120	<3.0	ug/L		
A807127	Total Antimony (Sb)	2022/11/23	105	80 - 120	105	80 - 120	<0.50	ug/L		
A807127	Total Arsenic (As)	2022/11/23	106	80 - 120	105	80 - 120	<0.10	ug/L		
A807127	Total Barium (Ba)	2022/11/23	101	80 - 120	102	80 - 120	<1.0	ug/L		
A807127	Total Beryllium (Be)	2022/11/23	98	80 - 120	98	80 - 120	<0.10	ug/L		
A807127	Total Bismuth (Bi)	2022/11/23	101	80 - 120	100	80 - 120	<1.0	ug/L		
A807127	Total Boron (B)	2022/11/23	97	80 - 120	97	80 - 120	<50	ug/L		
A807127	Total Cadmium (Cd)	2022/11/23	102	80 - 120	101	80 - 120	<0.010	ug/L		
A807127	Total Chromium (Cr)	2022/11/23	101	80 - 120	101	80 - 120	<1.0	ug/L		
A807127	Total Cobalt (Co)	2022/11/23	97	80 - 120	97	80 - 120	<0.20	ug/L		
A807127	Total Copper (Cu)	2022/11/23	100	80 - 120	99	80 - 120	<0.50	ug/L		
A807127	Total Iron (Fe)	2022/11/23	102	80 - 120	104	80 - 120	<10	ug/L	2.2 (1)	20
A807127	Total Lead (Pb)	2022/11/23	101	80 - 120	100	80 - 120	<0.20	ug/L		
A807127	Total Lithium (Li)	2022/11/23	94	80 - 120	94	80 - 120	<2.0	ug/L		
A807127	Total Manganese (Mn)	2022/11/23	101	80 - 120	100	80 - 120	<1.0	ug/L	6.5 (1)	20
A807127	Total Molybdenum (Mo)	2022/11/23	104	80 - 120	103	80 - 120	<1.0	ug/L		

BUREAU
VERITAS

Bureau Veritas Job #: C291536

Report Date: 2022/12/08

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-15.1- UPLAND LANDFILL

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A807127	Total Nickel (Ni)	2022/11/23	100	80 - 120	100	80 - 120	<1.0	ug/L		
A807127	Total Phosphorus (P)	2022/11/23	103	80 - 120	102	80 - 120	<10	ug/L		
A807127	Total Selenium (Se)	2022/11/23	105	80 - 120	106	80 - 120	<0.10	ug/L		
A807127	Total Silicon (Si)	2022/11/23	117	80 - 120	112	80 - 120	<100	ug/L		
A807127	Total Silver (Ag)	2022/11/23	101	80 - 120	100	80 - 120	<0.020	ug/L		
A807127	Total Strontium (Sr)	2022/11/23	102	80 - 120	103	80 - 120	<1.0	ug/L		
A807127	Total Thallium (Tl)	2022/11/23	104	80 - 120	102	80 - 120	<0.010	ug/L		
A807127	Total Tin (Sn)	2022/11/23	102	80 - 120	101	80 - 120	<5.0	ug/L		
A807127	Total Titanium (Ti)	2022/11/23	103	80 - 120	103	80 - 120	<5.0	ug/L		
A807127	Total Uranium (U)	2022/11/23	104	80 - 120	104	80 - 120	<0.10	ug/L		
A807127	Total Vanadium (V)	2022/11/23	102	80 - 120	101	80 - 120	<5.0	ug/L		
A807127	Total Zinc (Zn)	2022/11/23	104	80 - 120	101	80 - 120	<5.0	ug/L		
A807127	Total Zirconium (Zr)	2022/11/23	104	80 - 120	102	80 - 120	<0.10	ug/L		
A807333	Total Sulphide	2022/11/23	109 (4)	80 - 120	110	80 - 120	<0.0018	mg/L	6.9 (1)	20
A808685	Total Suspended Solids	2022/11/25	93	80 - 120	103	80 - 120	<1.0	mg/L	NC (1)	20
A809424	Total Mercury (Hg)	2022/11/25	77 (5)	80 - 120	93	80 - 120	<0.0019	ug/L	0.49 (1)	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [BHI247-05]

(3) Duplicate Parent ID [BHI247-05]

(4) Matrix Spike Parent ID [BHI247-03]

(5) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



BUREAU
VERITAS

Bureau Veritas Job #: C291536

Report Date: 2022/12/08

GHD Limited

Client Project #: 11222680-15.1- UPLAND LANDFILL

Site Location: NEW LANDFILL

Your P.O. #: 735-002640-1

Sampler Initials: CXW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager



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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



C291536_COC

Only

Bottle Order #:

678155

Project Manager

Thomas Pinchin

Chain Of Custody Record



C#678155-01-01

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name		Quotation #	C20003
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #	735-002640-2
Address	455 PHILLIP STREET WATERLOO ON N2L 3X2	Address		Project #	11222680-15.1
Phone	(519) 884-0510	Phone		Project Name	Upland Landfill
Fax	(519) 725-1394	Fax		Site #	Surface Water
Email	APinvoices-735@ghd.com	Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Sampled By	CXN, MR

Regulatory Criteria:

- ☒ CSR
☐ CCME
☐ BC Water Quality
☐ Other

Special Instructions

Total metals + hg not filtered

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT:

(will be applied if Rush TAT is not specified):

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐

Rush Confirmation Number:

(call lab for #)

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y/N)	Conductivity, Cl, SO4, NO2, NO3, N+N, PO4	Speciated Alkalinity	Sulphide + H2S Calc	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Total Suspended Solids (TSS)	Total Metals with CV Hg	Dissolved Hardness	Field pH	Field Temperature	# of Bottles	Comments
1	WS-1122680-171122-CXN-01	Nov 17/22	09:40	WATER	Y	X	X	X	X	X	X	X	X	7.22	5.78	7	
2	WS-1122680-171122-CXN-02	↓	13:30	↓	Y	X	X	X	X	X	X	X	X	8.47	10.01	7	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only		
CARMY WONG		22/11/22	18:40	T. FIONALLO		2022/11/19	08:00		Time Sensitive ☐	Temperature (°C) on Receipt 6/5/4	Custody Seal Intact on Cooler? ☐ Yes ☒ No

UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Bureau Veritas Yellow: Client

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-004088
Your Project #: 11222680-13.1- ORIGINAL LANDFI
Site#: LEACHATE WATER
Site Location: ORIGINAL LANDFILL
Your C.O.C. #: 678160-02-01

Report Date: 2022/12/30
Report #: R3283909
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT**BUREAU VERITAS JOB #: C291540****Received: 2022/11/19, 09:00**

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	2	N/A	2022/11/22	BBY6SOP-00026	SM 23 2320 B m
Biochemical Oxygen Demand	2	2022/11/19	2022/11/24	BBY6SOP-00045	SM 23 5210 B m
BTEX/MTBE LH, VH, F1 SIM/MS	2	N/A	2022/11/21	BBY8SOP-00010 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Sep 2017
Chloride/Sulphate by Auto Colourimetry	2	N/A	2022/11/21	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
COD by Colorimeter	2	N/A	2022/11/22	BBY6SOP-00024	SM 23 5220 D m
Total Phenols Calculation (1)	1	N/A	2022/12/02		Auto Calc
Conductivity @25C	2	N/A	2022/11/22	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H ₂ S)	2	N/A	2022/11/23	BBY WI-00033	Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	2	N/A	2022/11/23	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	1	N/A	2022/11/23	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	1	N/A	2022/11/28	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (3)	1	2022/12/15	2022/12/15	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV	2	2022/11/25	2022/11/25	AB SOP-00084	BCMOE BCLM Oct2013 m
Hydroxyphenols (Water) (1)	1	2022/11/30	2022/11/30	CAL SOP-00275	EPA 8270e m
ICP-OES Dissolved Metals in Water (3)	1	N/A	2022/11/22	BBY7SOP-00018	EPA 6010d m
ICP-OES Dissolved Metals in Water (3)	1	N/A	2022/11/28	BBY7SOP-00018	EPA 6010d m
EPH in Water when PAH required	2	2022/11/22	2022/11/22	BBY8SOP-00029	BCMOE BCLM Sep2017 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	1	N/A	2022/12/15	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (3)	1	N/A	2022/12/14	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	2022/11/19	2022/11/23	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	2	2022/11/23	2022/11/23	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	2	N/A	2022/11/22	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate + Nitrite (N)	2	N/A	2022/11/22	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	2	N/A	2022/11/22	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	2	N/A	2022/11/22	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	2	2022/11/22	2022/11/22	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (4)	2	N/A	2022/11/23	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	2	N/A	2022/11/19	BBY7 WI-00004	SM 23 3030B m

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-004088
Your Project #: 11222680-13.1- ORIGINAL LANDFI
Site#: LEACHATE WATER
Site Location: ORIGINAL LANDFILL
Your C.O.C. #: 678160-02-01

Report Date: 2022/12/30
Report #: R3283909
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT**BUREAU VERITAS JOB #: C291540****Received: 2022/11/19, 09:00**

Sample Matrix: Water
Samples Received: 3

Analyses	Date		Date Analyzed	Laboratory Method	Analytical Method
	Quantity	Extracted			
Orthophosphate by Konelab (5)	2	N/A	2022/11/22	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	2	N/A	2022/11/23	AB SOP-00080	SM 23 4500 S2-A D Fm
Phenols in Water by GCMS (BC) (1)	1	2022/11/30	2022/11/30	CAL SOP-00164	EPA 8270E m
Total Dissolved Solids (Filt. Residue)	2	2022/11/24	2022/11/25	BBY6SOP-00033	SM 23 2540 C m
EPH less PAH in Water by GC/FID (6)	2	N/A	2022/11/23	BBY WI-00033	Auto Calc
Total Suspended Solids (NFR)	2	2022/11/24	2022/11/25	BBY6SOP-00034	SM 23 2540 D m
Field pH	2	N/A	2022/11/19		
Field Temperature	2	N/A	2022/11/19		
Volatile HC-BTEX (7)	2	N/A	2022/11/22	BBY WI-00033	Auto Calc
PFAS in water by SPE/LC-MS/MS (2, 8)	2	2022/12/12	2022/12/13	CAM SOP-00894	EPA 537 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) This test was performed by Bureau Veritas Campobello, 6740 Campobello Road , Mississauga, ON, L5N 2L8



Attention: Aïresse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-004088
Your Project #: 11222680-13.1- ORIGINAL LANDFI
Site#: LEACHATE WATER
Site Location: ORIGINAL LANDFILL
Your C.O.C. #: 678160-02-01

Report Date: 2022/12/30
Report #: R3283909
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C291540

Received: 2022/11/19, 09:00

- (3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (4) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.
- (5) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (6) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)
HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)
- (7) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)
- (8) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.
- Per- and Polyfluoroalkyl Substances (PFAS) data were evaluated against the prescribed elements for performance and quality in the British Columbia Environmental Laboratory Manual Performance Based PFAS Method (PBM).

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Brody Andersen, B.Sc., B.Sc., Program Specialist–Emergency Spill Response
Email: Brody.Andersen@bureauveritas.com
Phone# (780)577-7120

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Raphael Kwan, Senior Manager, BC and Yukon Regions responsible for British Columbia Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BHI290	BHI290		BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 10:40		2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-01 Lab-Dup	RDL	WL-11222680-171122- CXW-02	RDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.050 (1)	N/A	0.050	<0.0050	0.0050	A806294

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	FIELD	N/A	ONSITE
Dissolved Hardness (CaCO3)	mg/L	950	N/A	0.50	610	0.50	A803334
Nitrate (N)	mg/L	<0.20	N/A	0.20	<0.020	0.020	A803349
Sulphide (as H2S)	mg/L	1.4	N/A	0.019	0.30	0.0038	A803329

Demand Parameters

Biochemical Oxygen Demand	mg/L	31	N/A	3.0	5.6	2.0	A803231
Chemical Oxygen Demand	mg/L	232	N/A	10	71	20	A804369

Field Parameters

Field pH	pH	6.11	N/A	N/A	6.80	N/A	ONSITE
Field Temperature	°C	4.53	N/A	N/A	11.60	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	2300	N/A	2.0	1500	2.0	A806744
Total Dissolved Solids	mg/L	1800	1800	10	960	10	A807429
Total Suspended Solids	mg/L	27 (2)	N/A	2.5	46 (2)	2.5	A808685

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	<1.0	1.0	A806743
Alkalinity (Total as CaCO3)	mg/L	250	N/A	1.0	370	1.0	A806743
Bicarbonate (HCO3)	mg/L	310	N/A	1.0	460	1.0	A806743
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	<1.0	1.0	A806743
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	<1.0	1.0	A806743
Total Sulphide	mg/L	1.3 (3)	N/A	0.018	0.28 (4)	0.0036	A807333
Chloride (Cl)	mg/L	120	N/A	1.0	79	1.0	A805379

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) RDL raised due to sample matrix interference.

(2) RDL raised due to high concentration of solids in the sample.

(3) Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.

(4) Detection limits raised due to sample matrix.

Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.



**BUREAU
VERITAS**

Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
Site Location: ORIGINAL LANDFILL
Your P.O. #: 735-004088
Sampler Initials: MR

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BHI290	BHI290		BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 10:40		2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-01 Lab-Dup	RDL	WL-11222680-171122- CXW-02	RDL	QC Batch
Sulphate (SO4)	mg/L	850	N/A	25	280	5.0	A805379
Nutrients							
Total Ammonia (N)	mg/L	12	N/A	0.15	2.5	0.075	A806140
Orthophosphate (P)	mg/L	<0.0030	<0.0030	0.0030	<0.0030	0.0030	A806249
Nitrate plus Nitrite (N)	mg/L	<0.20 (1)	N/A	0.20	<0.020	0.020	A806292
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) RDL raised due to sample matrix interference.							



BUREAU
VERITAS

Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
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Your P.O. #: 735-004088
Sampler Initials: MR

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BHI290		
Sampling Date		2022/11/17 10:40		
COC Number		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	RDL	QC Batch
Phenols				
2-Hydroxyphenol (Catechol)	ug/L	<20	20	A814321
3-Hydroxyphenol (Resorcinol)	ug/L	<10	10	A814321
4-Hydroxyphenol (Hydroquinone)	ug/L	2.3	1.0	A814321
Total Dichlorophenols	ug/L	0.51	0.22	A810610
Total Chlorophenols	ug/L	2.1	0.41	A810610
Total Monochlorophenols	ug/L	<0.090	0.090	A810610
Total Nonchlorinated Phenols	ug/L	51	1.6	A810610
Total Tetrachlorophenols	ug/L	0.29	0.17	A810610
Total Trichlorophenols	ug/L	0.46	0.24	A810610
SEMI-VOLATILE ORGANICS				
Phenol	ug/L	16	0.50	A814320
2-chlorophenol	ug/L	<0.050	0.050	A814320
3 & 4-chlorophenol	ug/L	<0.075	0.075	A814320
2-methylphenol	ug/L	0.92	0.50	A814320
3 & 4-methylphenol	ug/L	34	0.50	A814320
2-nitrophenol	ug/L	<0.50	0.50	A814320
2,4-dimethylphenol	ug/L	<0.50	0.50	A814320
2,4 + 2,5-Dichlorophenol	ug/L	0.30	0.10	A814320
2,3-Dichlorophenol	ug/L	<0.10	0.10	A814320
2,6-dichlorophenol	ug/L	<0.10	0.10	A814320
3,5-Dichlorophenol	ug/L	<0.10	0.10	A814320
3,4-Dichlorophenol	ug/L	0.20	0.10	A814320
2,4,5-trichlorophenol	ug/L	0.20	0.10	A814320
2,4,6-trichlorophenol	ug/L	<0.10	0.10	A814320
2,3,5-trichlorophenol	ug/L	<0.10	0.10	A814320
2,3,6-Trichlorophenol	ug/L	<0.10	0.10	A814320
2,3,4-trichlorophenol	ug/L	<0.10	0.10	A814320
3,4,5-Trichlorophenol	ug/L	0.26	0.10	A814320
2,4-dinitrophenol	ug/L	<0.50	0.50	A814320
4,6-dinitro-2-methylphenol	ug/L	<0.50	0.50	A814320
2,3,4,6-tetrachlorophenol	ug/L	0.16	0.10	A814320
RDL = Reportable Detection Limit				



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

SEMIVOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		BHI290		
Sampling Date		2022/11/17 10:40		
COC Number		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	RDL	QC Batch
2,3,4,5-tetrachlorophenol	ug/L	<0.10	0.10	A814320
2,3,5,6-tetrachlorophenol	ug/L	0.13	0.10	A814320
4-nitrophenol	ug/L	<0.50	0.50	A814320
2,6-Dimethylphenol	ug/L	<0.50	0.50	A814320
3,4-Dimethylphenol	ug/L	<0.50	0.50	A814320
4-chloro-3-methylphenol	ug/L	<0.10	0.10	A814320
Pentachlorophenol	ug/L	0.81	0.10	A814320
Surrogate Recovery (%)				
2,4,6-TRIBROMOPHENOL (sur.)	%	79	N/A	A814321
2,4-DIBROMOPHENOL (sur.)	%	78	N/A	A814321
2,4,6-TRIBROMOPHENOL (sur.)	%	123	N/A	A814320
2,4-DIBROMOPHENOL (sur.)	%	108	N/A	A814320
RDL = Reportable Detection Limit				
N/A = Not Applicable				



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

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Your P.O. #: 735-004088

Sampler Initials: MR

MERCURY BY COLD VAPOR (WATER)

Bureau Veritas ID		BHI291		
Sampling Date		2022/11/17 11:46		
COC Number		678160-02-01		
	UNITS	WL-11222680-171122- CXW-02	RDL	QC Batch
Elements				
Dissolved Mercury (Hg)	ug/L	<0.0019	0.0019	A831800
RDL = Reportable Detection Limit				



**BUREAU
VERITAS**

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		BHI290		BHI290			BHI291		
Sampling Date		2022/11/17 10:40		2022/11/17 10:40			2022/11/17 11:46		
COC Number		678160-02-01		678160-02-01			678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	RDL	WL-11222680-171122- CXW-01 Lab-Dup	RDL	QC Batch	WL-11222680-171122- CXW-02	RDL	QC Batch

Dissolved Metals by ICP									
Dissolved Calcium (Ca)	mg/L	318	0.050	317	0.50	A812606	189	0.050	A806255
Dissolved Magnesium (Mg)	mg/L	37.7	0.050	37.5	0.050	A812606	33.6	0.050	A806255
RDL = Reportable Detection Limit									
Lab-Dup = Laboratory Initiated Duplicate									



BUREAU
VERITAS

Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
Site Location: ORIGINAL LANDFILL
Your P.O. #: 735-004088
Sampler Initials: MR

SUBCONTRACTED ANALYSIS (WATER)

Bureau Veritas ID		BHI290		BHI292		
Sampling Date		2022/11/17 10:40		2022/11/18 10:00		
COC Number		678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	RDL	W-11222680-181122- CXW-01	RDL	QC Batch
Perfluorinated Compounds						
Perfluorobutanoic acid	ug/L	0.56	0.020	<0.020	0.020	A835194
Perfluoropentanoic Acid (PFPeA)	ug/L	4.3	0.20	<0.020	0.020	A835194
Perfluorohexanoic Acid (PFHxA)	ug/L	2.3	0.20	<0.020	0.020	A835194
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.84	0.020	<0.020	0.020	A835194
Perfluorooctanoic Acid (PFOA)	ug/L	0.57	0.020	<0.020	0.020	A835194
Perfluorononanoic Acid (PFNA)	ug/L	0.074	0.020	<0.020	0.020	A835194
Perfluorodecanoic Acid (PFDA)	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorotridecanoic Acid	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorotetradecanoic Acid	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorobutanesulfonic acid	ug/L	0.11	0.020	<0.020	0.020	A835194
Perfluoropentanesulfonic acid	ug/L	0.024	0.020	<0.020	0.020	A835194
Perfluorohexanesulfonic acid	ug/L	0.30	0.020	<0.020	0.020	A835194
Perfluoroheptanesulfonic acid	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorooctanesulfonic acid	ug/L	0.66	0.020	<0.020	0.020	A835194
Perfluorononane sulfonic acid	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.020	0.020	<0.020	0.020	A835194
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.020	0.020	<0.020	0.020	A835194
Surrogate Recovery (%)						
13C2-Perfluorodecanoic acid	%	70	N/A	80	N/A	A835194
13C2-Perfluorododecanoic acid	%	56	N/A	62	N/A	A835194
13C2-Perfluorohexanoic acid	%	71	N/A	92	N/A	A835194
13C2-perfluorotetradecanoic acid	%	46	N/A	24	N/A	A835194
13C2-Perfluoroundecanoic acid	%	65	N/A	75	N/A	A835194
13C3-Perfluorobutanesulfonic acid	%	81	N/A	88	N/A	A835194
13C4-Perfluorobutanoic acid	%	77	N/A	87	N/A	A835194
13C4-Perfluoroheptanoic acid	%	69	N/A	87	N/A	A835194
13C4-Perfluorooctanesulfonic acid	%	64	N/A	78	N/A	A835194
13C4-Perfluorooctanoic acid	%	85	N/A	86	N/A	A835194
RDL = Reportable Detection Limit N/A = Not Applicable						



**BUREAU
VERITAS**

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

SUBCONTRACTED ANALYSIS (WATER)

Bureau Veritas ID		BHI290		BHI292		
Sampling Date		2022/11/17 10:40		2022/11/18 10:00		
COC Number		678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	RDL	W-11222680-181122- CXW-01	RDL	QC Batch
13C5-Perfluorononanoic acid	%	84	N/A	83	N/A	A835194
13C5-Perfluoropentanoic acid	%	65	N/A	89	N/A	A835194
13C8-Perfluorooctane Sulfonamide	%	66	N/A	77	N/A	A835194
18O2-Perfluorohexanesulfonic acid	%	83	N/A	85	N/A	A835194
RDL = Reportable Detection Limit N/A = Not Applicable						



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

MISCELLANEOUS (WATER)

Bureau Veritas ID		BHI290	BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-02	RDL	QC Batch
Calculated Parameters					
Total Un-ionized Hydrogen Sulfide as S	mg/L	1.2	0.19	0.0050	A803331
Total Un-ionized Hydrogen Sulfide as H ₂ S	mg/L	1.3	0.20	0.0050	A803331
RDL = Reportable Detection Limit					



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

CSR BTEX/VPH IN WATER (WATER)

Bureau Veritas ID		BHI290	BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-02	RDL	QC Batch
Calculated Parameters					
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	300	A803366
Volatiles					
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	4.0	A804417
Benzene	ug/L	<0.40	<0.40	0.40	A804417
Toluene	ug/L	3.3	<0.40	0.40	A804417
Ethylbenzene	ug/L	1.2	<0.40	0.40	A804417
m & p-Xylene	ug/L	3.0	<0.40	0.40	A804417
o-Xylene	ug/L	1.4	<0.40	0.40	A804417
Styrene	ug/L	<0.40	<0.40	0.40	A804417
Xylenes (Total)	ug/L	4.4	<0.40	0.40	A804417
VH C6-C10	ug/L	<300	<300	300	A804417
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	91	101	N/A	A804417
4-Bromofluorobenzene (sur.)	%	93	95	N/A	A804417
D4-1,2-Dichloroethane (sur.)	%	90	98	N/A	A804417
RDL = Reportable Detection Limit					
N/A = Not Applicable					

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Bureau Veritas ID		BHI290	BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-02	RDL	QC Batch
Calculated Parameters					
Low Molecular Weight PAH's	ug/L	5.6	1.3	0.10	A803355
High Molecular Weight PAH's	ug/L	0.12	<0.050	0.050	A803355
Total PAH	ug/L	5.7	1.3	0.10	A803355
Polycyclic Aromatics					
Quinoline	ug/L	0.34	0.025	0.020	A805995
Naphthalene	ug/L	3.2	0.65	0.10	A805995
1-Methylnaphthalene	ug/L	0.29	0.12	0.050	A805995
2-Methylnaphthalene	ug/L	0.39	<0.10	0.10	A805995
Acenaphthylene	ug/L	<0.050	<0.050	0.050	A805995
Acenaphthene	ug/L	0.71	0.22	0.050	A805995
Fluorene	ug/L	0.38	0.053 (1)	0.050	A805995
Phenanthrene	ug/L	0.26	<0.050	0.050	A805995
Anthracene	ug/L	0.026	0.029	0.010	A805995
Acridine	ug/L	<0.050	0.20	0.050	A805995
Fluoranthene	ug/L	0.062	<0.020	0.020	A805995
Pyrene	ug/L	0.048	<0.020	0.020	A805995
Benzo(a)anthracene	ug/L	0.013	<0.010	0.010	A805995
Chrysene	ug/L	<0.020	<0.020	0.020	A805995
Benzo(b&j)fluoranthene	ug/L	<0.030	<0.030	0.030	A805995
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	0.050	A805995
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	0.0050	A805995
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	0.050	A805995
Dibenz(a,h)anthracene	ug/L	<0.0030	<0.0030	0.0030	A805995
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	0.050	A805995
Calculated Parameters					
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	0.20	A803364
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	0.20	A803364
Ext. Pet. Hydrocarbon					
EPH (C10-C19)	mg/L	<0.20	<0.20	0.20	A806003
RDL = Reportable Detection Limit					
(1) Tentatively identified result and may be potentially biased high due to matrix interference.					



**BUREAU
VERITAS**

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Bureau Veritas ID		BHI290	BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-02	RDL	QC Batch
EPH (C19-C32)	mg/L	<0.20	<0.20	0.20	A806003
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	97	98	N/A	A806003
D10-ANTHRACENE (sur.)	%	99	98	N/A	A805995
D8-ACENAPHTHYLENE (sur.)	%	103	100	N/A	A805995
D8-NAPHTHALENE (sur.)	%	97	94	N/A	A805995
TERPHENYL-D14 (sur.)	%	90	85	N/A	A805995
RDL = Reportable Detection Limit					
N/A = Not Applicable					



BUREAU
VERITAS

Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
Site Location: ORIGINAL LANDFILL
Your P.O. #: 735-004088
Sampler Initials: MR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI291		
Sampling Date		2022/11/17 11:46		
COC Number		678160-02-01		
	UNITS	WL-11222680-171122- CXW-02	RDL	QC Batch
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	ug/L	21.5	6.0	A830704
Dissolved Antimony (Sb)	ug/L	<1.0	1.0	A830704
Dissolved Arsenic (As)	ug/L	0.91	0.20	A830704
Dissolved Barium (Ba)	ug/L	61.4	2.0	A830704
Dissolved Beryllium (Be)	ug/L	<0.20	0.20	A830704
Dissolved Bismuth (Bi)	ug/L	<2.0	2.0	A830704
Dissolved Boron (B)	ug/L	307	100	A830704
Dissolved Cadmium (Cd)	ug/L	<0.020	0.020	A830704
Dissolved Chromium (Cr)	ug/L	<2.0	2.0	A830704
Dissolved Cobalt (Co)	ug/L	3.62	0.40	A830704
Dissolved Copper (Cu)	ug/L	<0.40	0.40	A830704
Dissolved Iron (Fe)	ug/L	36400	10	A830704
Dissolved Lead (Pb)	ug/L	<0.40	0.40	A830704
Dissolved Lithium (Li)	ug/L	<4.0	4.0	A830704
Dissolved Manganese (Mn)	ug/L	10100	2.0	A830704
Dissolved Molybdenum (Mo)	ug/L	<2.0	2.0	A830704
Dissolved Nickel (Ni)	ug/L	<2.0	2.0	A830704
Dissolved Phosphorus (P)	ug/L	34	20	A830704
Dissolved Selenium (Se)	ug/L	0.22	0.20	A830704
Dissolved Silicon (Si)	ug/L	5780	200	A830704
Dissolved Silver (Ag)	ug/L	<0.040	0.040	A830704
Dissolved Strontium (Sr)	ug/L	724	2.0	A830704
Dissolved Thallium (Tl)	ug/L	<0.020	0.020	A830704
Dissolved Tin (Sn)	ug/L	<10	10	A830704
Dissolved Titanium (Ti)	ug/L	<10	10	A830704
Dissolved Uranium (U)	ug/L	<0.20	0.20	A830704
Dissolved Vanadium (V)	ug/L	<10	10	A830704
Dissolved Zinc (Zn)	ug/L	<10	10	A830704
Dissolved Zirconium (Zr)	ug/L	0.31	0.20	A830704
Dissolved Potassium (K)	mg/L	6.98	0.10	A826637
Dissolved Sodium (Na)	mg/L	72.5	0.10	A826637
RDL = Reportable Detection Limit				



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI291		
Sampling Date		2022/11/17 11:46		
COC Number		678160-02-01		
	UNITS	WL-11222680-171122- CXW-02	RDL	QC Batch
Dissolved Sulphur (S)	mg/L	106	6.0	A826637
RDL = Reportable Detection Limit				



BUREAU
VERITAS

Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
Site Location: ORIGINAL LANDFILL
Your P.O. #: 735-004088
Sampler Initials: MR

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI290	BHI290		BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 10:40		2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-01 Lab-Dup	RDL	WL-11222680-171122- CXW-02	RDL	QC Batch

Elements							
Total Mercury (Hg)	ug/L	0.0062	0.0061	0.0019	<0.0019 (1)	0.0019	A809424
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	1580	N/A	15	84.6	6.0	A807127
Total Antimony (Sb)	ug/L	<2.5	N/A	2.5	<1.0	1.0	A807127
Total Arsenic (As)	ug/L	5.07	N/A	0.50	1.03	0.20	A807127
Total Barium (Ba)	ug/L	64.6	N/A	5.0	59.1	2.0	A807127
Total Beryllium (Be)	ug/L	<0.50	N/A	0.50	<0.20	0.20	A807127
Total Bismuth (Bi)	ug/L	<5.0	N/A	5.0	<2.0	2.0	A807127
Total Boron (B)	ug/L	7300	N/A	250	221	100	A807127
Total Cadmium (Cd)	ug/L	0.221	N/A	0.050	<0.020	0.020	A807127
Total Chromium (Cr)	ug/L	5.3	N/A	5.0	<2.0	2.0	A807127
Total Cobalt (Co)	ug/L	8.9	N/A	1.0	3.60	0.40	A807127
Total Copper (Cu)	ug/L	40.2	N/A	2.5	1.0	1.0	A807127
Total Iron (Fe)	ug/L	15200	N/A	50	35100	20	A807127
Total Lead (Pb)	ug/L	<1.0	N/A	1.0	<0.40	0.40	A807127
Total Lithium (Li)	ug/L	<10	N/A	10	<4.0	4.0	A807127
Total Manganese (Mn)	ug/L	2810	N/A	5.0	9540	2.0	A807127
Total Molybdenum (Mo)	ug/L	<5.0	N/A	5.0	<2.0	2.0	A807127
Total Nickel (Ni)	ug/L	9.3	N/A	5.0	<2.0	2.0	A807127
Total Phosphorus (P)	ug/L	330	N/A	50	43	20	A807127
Total Selenium (Se)	ug/L	0.56	N/A	0.50	0.20	0.20	A807127
Total Silicon (Si)	ug/L	9320	N/A	500	5650	200	A807127
Total Silver (Ag)	ug/L	<0.10	N/A	0.10	<0.040	0.040	A807127
Total Strontium (Sr)	ug/L	1580	N/A	5.0	697	2.0	A807127
Total Thallium (Tl)	ug/L	<0.050	N/A	0.050	<0.020	0.020	A807127
Total Tin (Sn)	ug/L	<25	N/A	25	<10	10	A807127
Total Titanium (Ti)	ug/L	<25	N/A	25	<10	10	A807127
Total Uranium (U)	ug/L	0.75	N/A	0.50	<0.20	0.20	A807127

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) Matrix spike exceeds acceptance limits due to probable matrix interference.



**BUREAU
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Bureau Veritas Job #: C291540
Report Date: 2022/12/30

GHD Limited
Client Project #: 11222680-13.1- ORIGINAL LANDFI
Site Location: ORIGINAL LANDFILL
Your P.O. #: 735-004088
Sampler Initials: MR

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI290	BHI290		BHI291		
Sampling Date		2022/11/17 10:40	2022/11/17 10:40		2022/11/17 11:46		
COC Number		678160-02-01	678160-02-01		678160-02-01		
	UNITS	WL-11222680-171122- CXW-01	WL-11222680-171122- CXW-01 Lab-Dup	RDL	WL-11222680-171122- CXW-02	RDL	QC Batch
Total Vanadium (V)	ug/L	<25	N/A	25	<10	10	A807127
Total Zinc (Zn)	ug/L	249	N/A	25	<10	10	A807127
Total Zirconium (Zr)	ug/L	<0.50	N/A	0.50	0.31	0.20	A807127
Total Calcium (Ca)	mg/L	268	N/A	0.25	186	0.10	A803344
Total Magnesium (Mg)	mg/L	32.9	N/A	0.25	32.5	0.10	A803344
Total Potassium (K)	mg/L	33.8	N/A	0.25	6.85	0.10	A803344
Total Sodium (Na)	mg/L	171	N/A	0.25	70.2	0.10	A803344
Total Sulphur (S)	mg/L	291	N/A	15	101	6.0	A803344
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							



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Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

GENERAL COMMENTS

Change Request: Report to include results for Full Dissolved Metals with Hg on sample CXW-02 as per client request received 2022/12/09.

Version 4: Report reissued to reflect corrected dissolved metals parameters on sample WL-11222680-171122-CXW-02 (BHI291) - duplicate Ca and Mg results removed.

Sample BHI290 [WL-11222680-171122-CXW-01] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Per- and polyfluoroalkyl substances (PFAS): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample BHI291 [WL-11222680-171122-CXW-02] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Results relate only to the items tested.



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Bureau Veritas Job #: C291540

Report Date: 2022/12/30

QUALITY ASSURANCE REPORT

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A804417	1,4-Difluorobenzene (sur.)	2022/11/21	114	70 - 130	98	70 - 130	105	%		
A804417	4-Bromofluorobenzene (sur.)	2022/11/21	93	70 - 130	86	70 - 130	99	%		
A804417	D4-1,2-Dichloroethane (sur.)	2022/11/21	113	70 - 130	93	70 - 130	105	%		
A805995	D10-ANTHRACENE (sur.)	2022/11/22	83	50 - 140	103	50 - 140	102	%		
A805995	D8-ACENAPHTHYLENE (sur.)	2022/11/22	99	50 - 140	101	50 - 140	101	%		
A805995	D8-NAPHTHALENE (sur.)	2022/11/22	97	50 - 140	93	50 - 140	98	%		
A805995	TERPHENYL-D14 (sur.)	2022/11/22	59	50 - 140	97	50 - 140	86	%		
A806003	O-TERPHENYL (sur.)	2022/11/22	100	60 - 140	98	60 - 140	98	%		
A814320	2,4,6-TRIBROMOPHENOL (sur.)	2022/11/30			114	60 - 130	115	%		
A814320	2,4-DIBROMOPHENOL (sur.)	2022/11/30			101	60 - 130	106	%		
A814321	2,4,6-TRIBROMOPHENOL (sur.)	2022/11/30			71	60 - 130	69	%		
A814321	2,4-DIBROMOPHENOL (sur.)	2022/11/30			72	60 - 130	71	%		
A835194	13C2-Perfluorodecanoic acid	2022/12/13			86	10 - 130	84	%		
A835194	13C2-Perfluorododecanoic acid	2022/12/13			79	10 - 130	75	%		
A835194	13C2-Perfluorohexanoic acid	2022/12/13			89	10 - 130	94	%		
A835194	13C2-perfluorotetradecanoic acid	2022/12/13			64	10 - 130	56	%		
A835194	13C2-Perfluoroundecanoic acid	2022/12/13			82	10 - 130	81	%		
A835194	13C3-Perfluorobutanesulfonic acid	2022/12/13			88	10 - 130	90	%		
A835194	13C4-Perfluorobutanoic acid	2022/12/13			88	10 - 130	90	%		
A835194	13C4-Perfluoroheptanoic acid	2022/12/13			89	10 - 130	89	%		
A835194	13C4-Perfluorooctanesulfonic acid	2022/12/13			85	10 - 130	78	%		
A835194	13C4-Perfluorooctanoic acid	2022/12/13			89	10 - 130	88	%		
A835194	13C5-Perfluorononanoic acid	2022/12/13			88	10 - 130	83	%		
A835194	13C5-Perfluoropentanoic acid	2022/12/13			89	10 - 130	90	%		
A835194	13C8-Perfluorooctane Sulfonamide	2022/12/13			80	10 - 130	84	%		
A835194	18O2-Perfluorohexanesulfonic acid	2022/12/13			88	10 - 130	85	%		
A803231	Biochemical Oxygen Demand	2022/11/24			99	85 - 115	<2.0	mg/L	1.1 (1)	20
A804369	Chemical Oxygen Demand	2022/11/22	NC	80 - 120	104	80 - 120	<10	mg/L	0.70 (1)	20
A804417	Benzene	2022/11/21	129	70 - 130	107	70 - 130	<0.40	ug/L	NC (1)	30
A804417	Ethylbenzene	2022/11/21	103	70 - 130	105	70 - 130	<0.40	ug/L	NC (1)	30
A804417	m & p-Xylene	2022/11/21	113	70 - 130	101	70 - 130	<0.40	ug/L	NC (1)	30



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Bureau Veritas Job #: C291540

Report Date: 2022/12/30

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A804417	Methyl-tert-butylether (MTBE)	2022/11/21	101	70 - 130	96	70 - 130	<4.0	ug/L	NC (1)	30
A804417	o-Xylene	2022/11/21	109	70 - 130	101	70 - 130	<0.40	ug/L	NC (1)	30
A804417	Styrene	2022/11/21	112	70 - 130	104	70 - 130	<0.40	ug/L	NC (1)	30
A804417	Toluene	2022/11/21	122	70 - 130	107	70 - 130	<0.40	ug/L	NC (1)	30
A804417	VH C6-C10	2022/11/21			86	70 - 130	<300	ug/L	NC (1)	30
A804417	Xylenes (Total)	2022/11/21					<0.40	ug/L	NC (1)	30
A805379	Chloride (Cl)	2022/11/21	109	80 - 120	103	80 - 120	<1.0	mg/L	2.7 (1)	20
A805379	Sulphate (SO4)	2022/11/21	NC	80 - 120	99	80 - 120	<1.0	mg/L	3.0 (1)	20
A805995	1-Methylnaphthalene	2022/11/22	87	50 - 140	86	50 - 140	<0.050	ug/L	NC (1)	40
A805995	2-Methylnaphthalene	2022/11/22	89	50 - 140	88	50 - 140	<0.10	ug/L	NC (1)	40
A805995	Acenaphthene	2022/11/22	92	50 - 140	93	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Acenaphthylene	2022/11/22	89	50 - 140	91	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Acridine	2022/11/22	100	50 - 140	98	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Anthracene	2022/11/22	91	50 - 140	96	50 - 140	<0.010	ug/L	NC (1)	40
A805995	Benzo(a)anthracene	2022/11/22	19 (2)	50 - 140	90	50 - 140	<0.010	ug/L	NC (1)	40
A805995	Benzo(a)pyrene	2022/11/22	4.5 (2)	50 - 140	105	50 - 140	<0.0050	ug/L	NC (1)	40
A805995	Benzo(b&j)fluoranthene	2022/11/22	4.6 (2)	50 - 140	95	50 - 140	<0.030	ug/L	NC (1)	40
A805995	Benzo(g,h,i)perylene	2022/11/22	2.1 (2)	50 - 140	91	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Benzo(k)fluoranthene	2022/11/22	5.1 (2)	50 - 140	92	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Chrysene	2022/11/22	19 (2)	50 - 140	91	50 - 140	<0.020	ug/L	NC (1)	40
A805995	Dibenz(a,h)anthracene	2022/11/22	2.2 (2)	50 - 140	97	50 - 140	<0.0030	ug/L	NC (1)	40
A805995	Fluoranthene	2022/11/22	73	50 - 140	80	50 - 140	<0.020	ug/L	NC (1)	40
A805995	Fluorene	2022/11/22	92	50 - 140	94	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Indeno(1,2,3-cd)pyrene	2022/11/22	2.2 (2)	50 - 140	95	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Naphthalene	2022/11/22	84	50 - 140	82	50 - 140	<0.10	ug/L	NC (1)	40
A805995	Phenanthrene	2022/11/22	87	50 - 140	91	50 - 140	<0.050	ug/L	NC (1)	40
A805995	Pyrene	2022/11/22	75	50 - 140	81	50 - 140	<0.020	ug/L	NC (1)	40
A805995	Quinoline	2022/11/22	100	50 - 140	99	50 - 140	<0.020	ug/L	NC (1)	40
A806003	EPH (C10-C19)	2022/11/22	88	60 - 140	87	70 - 130	<0.20	mg/L	NC (1)	30
A806003	EPH (C19-C32)	2022/11/22	112	60 - 140	109	70 - 130	<0.20	mg/L	NC (1)	30
A806140	Total Ammonia (N)	2022/11/22	97	80 - 120	100	80 - 120	<0.015	mg/L	NC (1)	20



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VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A806249	Orthophosphate (P)	2022/11/22	93 (3)	80 - 120	108	80 - 120	<0.0030	mg/L	NC (4)	20
A806255	Dissolved Calcium (Ca)	2022/11/22	100	80 - 120	102	80 - 120	<0.050	mg/L	1.4 (1)	20
A806255	Dissolved Magnesium (Mg)	2022/11/22	102	80 - 120	100	80 - 120	<0.050	mg/L	0.19 (1)	20
A806292	Nitrate plus Nitrite (N)	2022/11/22	110	80 - 120	107	80 - 120	<0.020	mg/L	NC (1)	25
A806294	Nitrite (N)	2022/11/22	106	80 - 120	101	80 - 120	<0.0050	mg/L	NC (1)	20
A806743	Alkalinity (PP as CaCO ₃)	2022/11/22					<1.0	mg/L		
A806743	Alkalinity (Total as CaCO ₃)	2022/11/22			96	80 - 120	<1.0	mg/L		
A806743	Bicarbonate (HCO ₃)	2022/11/22					<1.0	mg/L		
A806743	Carbonate (CO ₃)	2022/11/22					<1.0	mg/L		
A806743	Hydroxide (OH)	2022/11/22					<1.0	mg/L		
A806744	Conductivity	2022/11/22			104	80 - 120	<2.0	uS/cm		
A807127	Total Aluminum (Al)	2022/11/23	100	80 - 120	99	80 - 120	<3.0	ug/L		
A807127	Total Antimony (Sb)	2022/11/23	105	80 - 120	105	80 - 120	<0.50	ug/L		
A807127	Total Arsenic (As)	2022/11/23	106	80 - 120	105	80 - 120	<0.10	ug/L		
A807127	Total Barium (Ba)	2022/11/23	101	80 - 120	102	80 - 120	<1.0	ug/L		
A807127	Total Beryllium (Be)	2022/11/23	98	80 - 120	98	80 - 120	<0.10	ug/L		
A807127	Total Bismuth (Bi)	2022/11/23	101	80 - 120	100	80 - 120	<1.0	ug/L		
A807127	Total Boron (B)	2022/11/23	97	80 - 120	97	80 - 120	<50	ug/L		
A807127	Total Cadmium (Cd)	2022/11/23	102	80 - 120	101	80 - 120	<0.010	ug/L		
A807127	Total Chromium (Cr)	2022/11/23	101	80 - 120	101	80 - 120	<1.0	ug/L		
A807127	Total Cobalt (Co)	2022/11/23	97	80 - 120	97	80 - 120	<0.20	ug/L		
A807127	Total Copper (Cu)	2022/11/23	100	80 - 120	99	80 - 120	<0.50	ug/L		
A807127	Total Iron (Fe)	2022/11/23	102	80 - 120	104	80 - 120	<10	ug/L	2.2 (1)	20
A807127	Total Lead (Pb)	2022/11/23	101	80 - 120	100	80 - 120	<0.20	ug/L		
A807127	Total Lithium (Li)	2022/11/23	94	80 - 120	94	80 - 120	<2.0	ug/L		
A807127	Total Manganese (Mn)	2022/11/23	101	80 - 120	100	80 - 120	<1.0	ug/L	6.5 (1)	20
A807127	Total Molybdenum (Mo)	2022/11/23	104	80 - 120	103	80 - 120	<1.0	ug/L		
A807127	Total Nickel (Ni)	2022/11/23	100	80 - 120	100	80 - 120	<1.0	ug/L		
A807127	Total Phosphorus (P)	2022/11/23	103	80 - 120	102	80 - 120	<10	ug/L		
A807127	Total Selenium (Se)	2022/11/23	105	80 - 120	106	80 - 120	<0.10	ug/L		
A807127	Total Silicon (Si)	2022/11/23	117	80 - 120	112	80 - 120	<100	ug/L		



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Bureau Veritas Job #: C291540

Report Date: 2022/12/30

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A807127	Total Silver (Ag)	2022/11/23	101	80 - 120	100	80 - 120	<0.020	ug/L		
A807127	Total Strontium (Sr)	2022/11/23	102	80 - 120	103	80 - 120	<1.0	ug/L		
A807127	Total Thallium (Tl)	2022/11/23	104	80 - 120	102	80 - 120	<0.010	ug/L		
A807127	Total Tin (Sn)	2022/11/23	102	80 - 120	101	80 - 120	<5.0	ug/L		
A807127	Total Titanium (Ti)	2022/11/23	103	80 - 120	103	80 - 120	<5.0	ug/L		
A807127	Total Uranium (U)	2022/11/23	104	80 - 120	104	80 - 120	<0.10	ug/L		
A807127	Total Vanadium (V)	2022/11/23	102	80 - 120	101	80 - 120	<5.0	ug/L		
A807127	Total Zinc (Zn)	2022/11/23	104	80 - 120	101	80 - 120	<5.0	ug/L		
A807127	Total Zirconium (Zr)	2022/11/23	104	80 - 120	102	80 - 120	<0.10	ug/L		
A807333	Total Sulphide	2022/11/23	109	80 - 120	110	80 - 120	<0.0018	mg/L	6.9 (1)	20
A807429	Total Dissolved Solids	2022/11/25	104	80 - 120	101	80 - 120	<10	mg/L	0.88 (4)	20
A808685	Total Suspended Solids	2022/11/25	93	80 - 120	103	80 - 120	<1.0	mg/L	NC (1)	20
A809424	Total Mercury (Hg)	2022/11/25	77 (2,5)	80 - 120	93	80 - 120	<0.0019	ug/L	0.49 (6)	20
A812606	Dissolved Calcium (Ca)	2022/11/28	NC (7)	80 - 120	106	80 - 120	<0.050	mg/L	0.54 (8)	20
A812606	Dissolved Magnesium (Mg)	2022/11/28	NC (7)	80 - 120	101	80 - 120	<0.050	mg/L	0.54 (8)	20
A814320	2,3,4,5-tetrachlorophenol	2022/11/30			114	60 - 130	<0.10	ug/L		
A814320	2,3,4,6-tetrachlorophenol	2022/11/30			129	60 - 130	<0.10	ug/L		
A814320	2,3,4-trichlorophenol	2022/11/30			111	60 - 130	<0.10	ug/L		
A814320	2,3,5,6-tetrachlorophenol	2022/11/30			103	60 - 130	<0.10	ug/L		
A814320	2,3,5-trichlorophenol	2022/11/30			104	60 - 130	<0.10	ug/L		
A814320	2,3,6-Trichlorophenol	2022/11/30			106	60 - 130	<0.10	ug/L		
A814320	2,3-Dichlorophenol	2022/11/30			104	60 - 130	<0.10	ug/L		
A814320	2,4 + 2,5-Dichlorophenol	2022/11/30			106	60 - 130	<0.10	ug/L		
A814320	2,4,5-trichlorophenol	2022/11/30			110	60 - 130	<0.10	ug/L		
A814320	2,4,6-trichlorophenol	2022/11/30			105	60 - 130	<0.10	ug/L		
A814320	2,4-dimethylphenol	2022/11/30			98	60 - 130	<0.50	ug/L		
A814320	2,4-dinitrophenol	2022/11/30			120	30 - 130	<0.50	ug/L		
A814320	2,6-dichlorophenol	2022/11/30			105	60 - 130	<0.10	ug/L		
A814320	2,6-Dimethylphenol	2022/11/30			98	60 - 130	<0.50	ug/L		
A814320	2-chlorophenol	2022/11/30			92	60 - 130	<0.050	ug/L		
A814320	2-methylphenol	2022/11/30			88	60 - 130	<0.50	ug/L		



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VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A814320	2-nitrophenol	2022/11/30			107	60 - 130	<0.50	ug/L		
A814320	3 & 4-chlorophenol	2022/11/30			96	60 - 130	<0.075	ug/L		
A814320	3 & 4-methylphenol	2022/11/30			85	60 - 130	<0.50	ug/L		
A814320	3,4,5-Trichlorophenol	2022/11/30			100	60 - 130	<0.10	ug/L		
A814320	3,4-Dichlorophenol	2022/11/30			97	60 - 130	<0.10	ug/L		
A814320	3,4-Dimethylphenol	2022/11/30			94	60 - 130	<0.50	ug/L		
A814320	3,5-Dichlorophenol	2022/11/30			108	60 - 130	<0.10	ug/L		
A814320	4,6-dinitro-2-methylphenol	2022/11/30			128	30 - 130	<0.50	ug/L		
A814320	4-chloro-3-methylphenol	2022/11/30			98	60 - 130	<0.10	ug/L		
A814320	4-nitrophenol	2022/11/30			68	60 - 130	<0.50	ug/L		
A814320	Pentachlorophenol	2022/11/30			104	60 - 130	<0.10	ug/L		
A814320	Phenol	2022/11/30			111	60 - 130	<0.50	ug/L		
A814321	2-Hydroxyphenol (Catechol)	2022/11/30			99	60 - 130	<20	ug/L		
A814321	3-Hydroxyphenol (Resorcinol)	2022/11/30			93	60 - 130	<10	ug/L		
A814321	4-Hydroxyphenol (Hydroquinone)	2022/11/30			93	60 - 130	<1.0	ug/L		
A830704	Dissolved Aluminum (Al)	2022/12/14	97	80 - 120	97	80 - 120	<3.0	ug/L	1.2 (1)	20
A830704	Dissolved Antimony (Sb)	2022/12/14	100	80 - 120	101	80 - 120	<0.50	ug/L	NC (1)	20
A830704	Dissolved Arsenic (As)	2022/12/14	104	80 - 120	101	80 - 120	<0.10	ug/L	0.21 (1)	20
A830704	Dissolved Barium (Ba)	2022/12/14	95	80 - 120	98	80 - 120	<1.0	ug/L	0.56 (1)	20
A830704	Dissolved Beryllium (Be)	2022/12/14	96	80 - 120	97	80 - 120	<0.10	ug/L	NC (1)	20
A830704	Dissolved Bismuth (Bi)	2022/12/14	92	80 - 120	97	80 - 120	<1.0	ug/L	NC (1)	20
A830704	Dissolved Boron (B)	2022/12/14	99	80 - 120	101	80 - 120	<50	ug/L	NC (1)	20
A830704	Dissolved Cadmium (Cd)	2022/12/14	97	80 - 120	98	80 - 120	<0.010	ug/L	NC (1)	20
A830704	Dissolved Chromium (Cr)	2022/12/14	98	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A830704	Dissolved Cobalt (Co)	2022/12/14	93	80 - 120	95	80 - 120	<0.20	ug/L	NC (1)	20
A830704	Dissolved Copper (Cu)	2022/12/14	94	80 - 120	98	80 - 120	<0.20	ug/L	8.2 (1)	20
A830704	Dissolved Iron (Fe)	2022/12/14	102	80 - 120	99	80 - 120	<5.0	ug/L	8.5 (1)	20
A830704	Dissolved Lead (Pb)	2022/12/14	95	80 - 120	98	80 - 120	<0.20	ug/L	NC (1)	20
A830704	Dissolved Lithium (Li)	2022/12/14	94	80 - 120	94	80 - 120	<2.0	ug/L	NC (1)	20
A830704	Dissolved Manganese (Mn)	2022/12/14	97	80 - 120	99	80 - 120	<1.0	ug/L	5.5 (1)	20
A830704	Dissolved Molybdenum (Mo)	2022/12/14	105	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A830704	Dissolved Nickel (Ni)	2022/12/14	94	80 - 120	97	80 - 120	<1.0	ug/L	NC (1)	20
A830704	Dissolved Phosphorus (P)	2022/12/14	106	80 - 120	100	80 - 120	<10	ug/L		
A830704	Dissolved Selenium (Se)	2022/12/14	100	80 - 120	97	80 - 120	<0.10	ug/L	NC (1)	20
A830704	Dissolved Silicon (Si)	2022/12/14	105	80 - 120	112	80 - 120	<100	ug/L	0.086 (1)	20
A830704	Dissolved Silver (Ag)	2022/12/14	97	80 - 120	97	80 - 120	<0.020	ug/L	NC (1)	20
A830704	Dissolved Strontium (Sr)	2022/12/14	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.37 (1)	20
A830704	Dissolved Thallium (Tl)	2022/12/14	97	80 - 120	100	80 - 120	<0.010	ug/L	NC (1)	20
A830704	Dissolved Tin (Sn)	2022/12/14	98	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
A830704	Dissolved Titanium (Ti)	2022/12/14	99	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
A830704	Dissolved Uranium (U)	2022/12/14	102	80 - 120	100	80 - 120	<0.10	ug/L	1.5 (1)	20
A830704	Dissolved Vanadium (V)	2022/12/14	99	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20
A830704	Dissolved Zinc (Zn)	2022/12/14	101	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
A830704	Dissolved Zirconium (Zr)	2022/12/14	103	80 - 120	100	80 - 120	<0.10	ug/L	NC (1)	20
A831800	Dissolved Mercury (Hg)	2022/12/15	86	80 - 120	86	80 - 120	<0.0019	ug/L	NC (1)	20
A835194	Perfluorobutanesulfonic acid	2022/12/13			102	70 - 130	<0.020	ug/L	1.2 (1)	30
A835194	Perfluorobutanoic acid	2022/12/13			101	70 - 130	<0.020	ug/L	0.49 (1)	30
A835194	Perfluorodecanesulfonic acid (PFDS)	2022/12/13			93	70 - 130	<0.020	ug/L	3.4 (1)	30
A835194	Perfluorodecanoic Acid (PFDA)	2022/12/13			102	70 - 130	<0.020	ug/L	1.7 (1)	30
A835194	Perfluorododecanoic Acid (PFDoA)	2022/12/13			103	70 - 130	<0.020	ug/L	0.12 (1)	30
A835194	Perfluoroheptanesulfonic acid	2022/12/13			95	70 - 130	<0.020	ug/L	1.2 (1)	30
A835194	Perfluoroheptanoic Acid (PFHpA)	2022/12/13			104	70 - 130	<0.020	ug/L	1.2 (1)	30
A835194	Perfluorohexanesulfonic acid	2022/12/13			101	70 - 130	<0.020	ug/L	0.43 (1)	30
A835194	Perfluorohexanoic Acid (PFHxA)	2022/12/13			103	70 - 130	<0.020	ug/L	0.17 (1)	30
A835194	Perfluorononane sulfonic acid	2022/12/13			88	70 - 130	<0.020	ug/L	3.8 (1)	30
A835194	Perfluorononanoic Acid (PFNA)	2022/12/13			102	70 - 130	<0.020	ug/L	1.6 (1)	30
A835194	Perfluorooctane Sulfonamide (PFOSA)	2022/12/13			98	70 - 130	<0.020	ug/L	2.9 (1)	30
A835194	Perfluorooctanesulfonic acid	2022/12/13			101	70 - 130	<0.020	ug/L	2.1 (1)	30
A835194	Perfluorooctanoic Acid (PFOA)	2022/12/13			103	70 - 130	<0.020	ug/L	0.14 (1)	30
A835194	Perfluoropentanesulfonic acid	2022/12/13			103	70 - 130	<0.020	ug/L	0.50 (1)	30
A835194	Perfluoropentanoic Acid (PFPeA)	2022/12/13			102	70 - 130	<0.020	ug/L	2.4 (1)	30
A835194	Perfluorotetradecanoic Acid	2022/12/13			106	70 - 130	<0.020	ug/L	3.1 (1)	30



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A835194	Perfluorotridecanoic Acid	2022/12/13			117	70 - 130	<0.020	ug/L	2.6 (1)	30
A835194	Perfluoroundecanoic Acid (PFUnA)	2022/12/13			100	70 - 130	<0.020	ug/L	2.0 (1)	30

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Duplicate Parent ID

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(3) Matrix Spike Parent ID [BHI290-04]

(4) Duplicate Parent ID [BHI290-04]

(5) Matrix Spike Parent ID [BHI291-07]

(6) Duplicate Parent ID [BHI290-07]

(7) Matrix Spike Parent ID [BHI290-08]

(8) Duplicate Parent ID [BHI290-08]



BUREAU
VERITAS

Bureau Veritas Job #: C291540

Report Date: 2022/12/30

GHD Limited

Client Project #: 11222680-13.1- ORIGINAL LANDFI

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: MR

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Colm McNamara, Senior Analyst, Liquid Chromatography

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

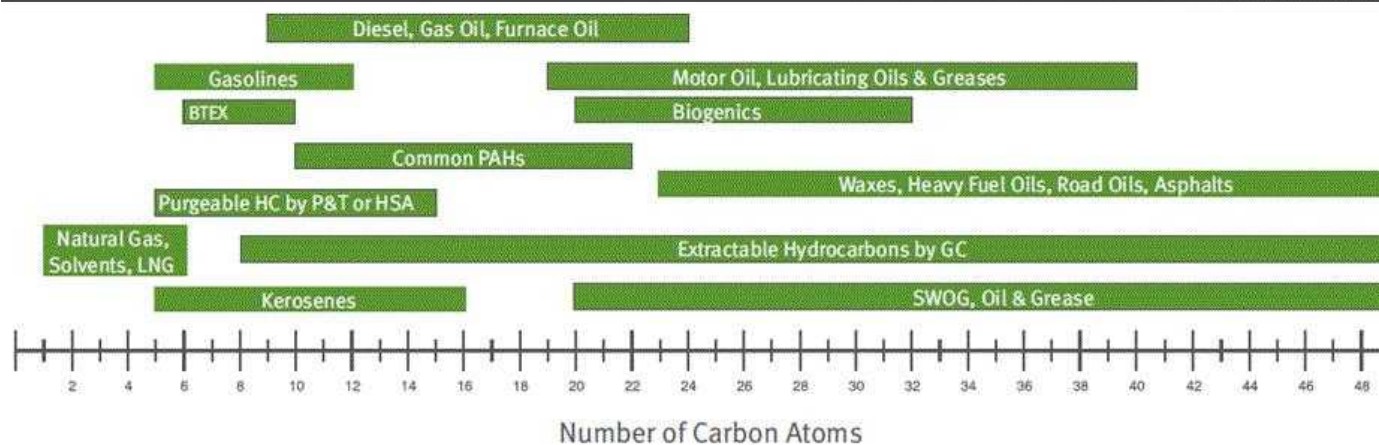
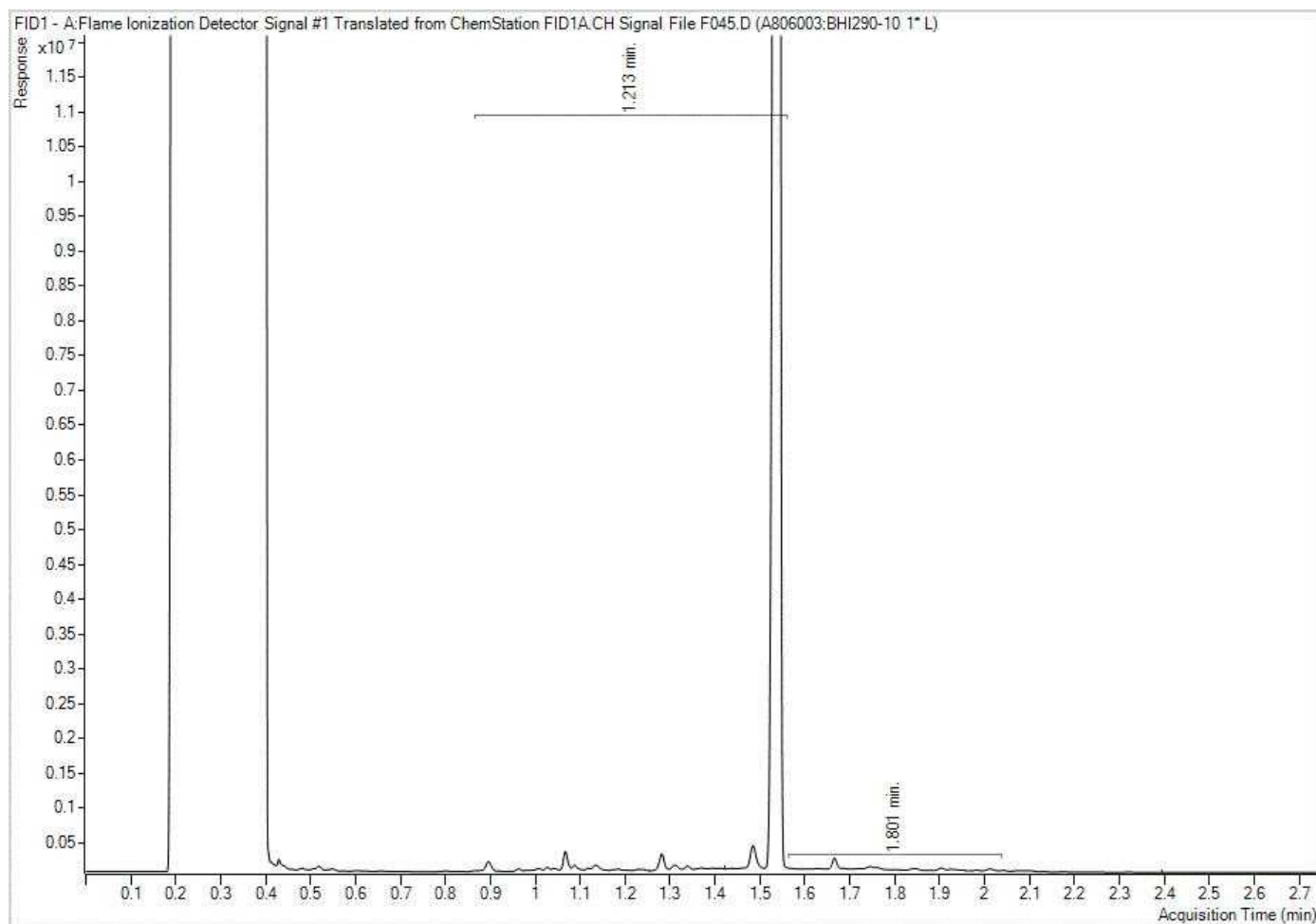


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Logiciel Propriétaire de Bureau Veritas

Automated Statchk

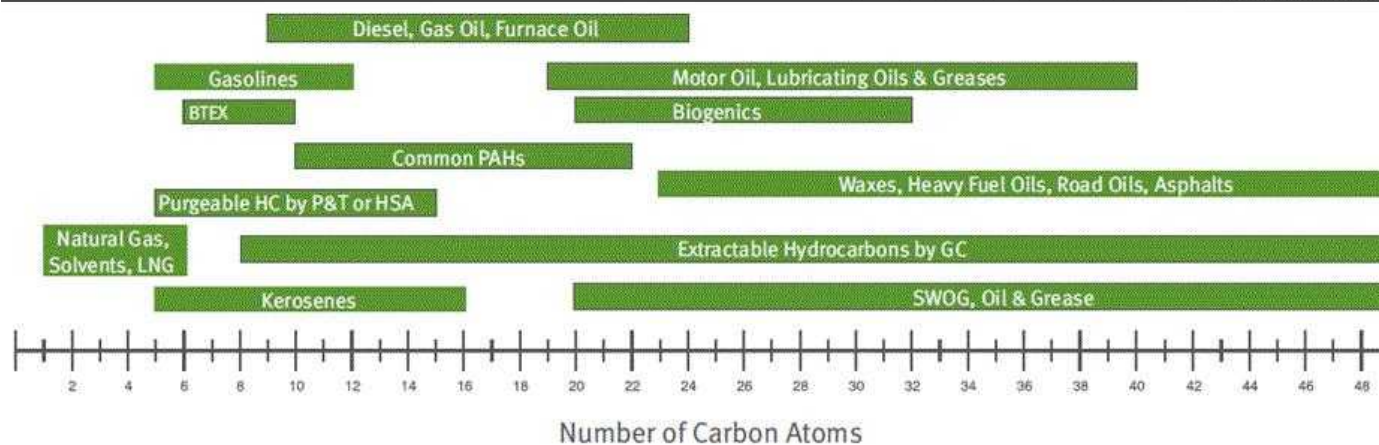
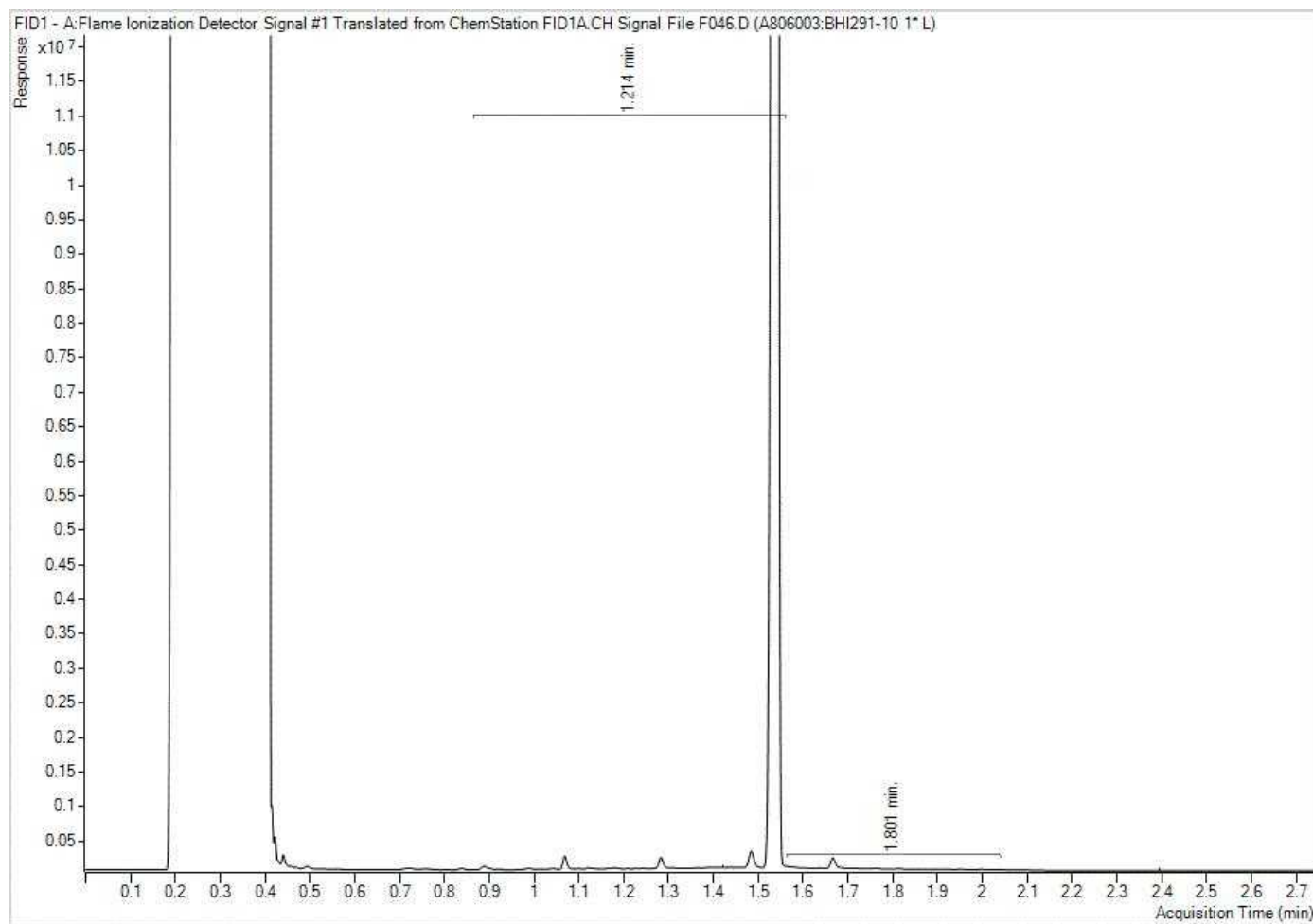
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EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.



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Bureau Veritas
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C291540_COC

Only

Bottle Order #:



678160

Project Manager

Thomas Pinchin

Chain Of Custody Record



C#678160-02-01

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name		Quotation #	C20003
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #	735-004088
Address	455 PHILLIP STREET WATERLOO ON N2L 3X2	Address		Project #	11222680-13.1
Phone	(519) 884-0510	Phone		Project Name	Upland Landfill
Fax	(519) 725-1394	Fax		Site #	Leachate Water
Email	APinvoices-735@ghd.com	Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Sampled By	CXIN, MP

Regulatory Criteria:

- ☒ CSR
☐ CCME
☐ BC Water Quality
☐ Other

Special Instructions

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT:

(will be applied if Rush TAT is not specified):

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐

Rush Confirmation Number:

(call lab for #)

of Bottles Comments

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y/N)	Conductivity, Cl, SO4, NO2, NO3, N+N, PO4, TDS, TSS, Sp. Alk, BOD5	Total Sulphide, Total H2S, Un-ionized (as H2S) - based on total	Ammonia-N (Total)	Total Metals with CV Hg (NO HARDNESS)	COD, PFOS, PFOA, PFBS, PFDS	Dissolved Hardness, or inorganic phosphate	LEPH/HEPH/PAH / EPH	BTEXVPH	Field pH	Field Temperature	# of Bottles	Comments
1	WL-11222680-171122-CXW-01	Nov 17, 22	10:40	Leachate	Y	X	X	X	X	X	X	X	X	6.11	4.53	14	
2	WL-11222680-171122-CXW-02	↓	11:46	↓	Y	X	X	X	X	X	X	X	X	6.80	11.60	14	
3	cy-11222680-181122CXW-01	Nov 18, 22 NA CXW	10:00 NA CXW	WATER	N											2	ANALYZE FOR PFAS ONLY.
4																	
5																	
6																	
7																	
8																	
9																	
10																	

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
CARY WONG	22/11/18	1840	FIONA LUO	20221119	09:00		☐	5/7/7	☒ Yes ☒ No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

100-402

**Attention: Aïresse MacPhee**

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-004088
Your Project #: 11222680 - ORIGINAL LANDFILL
Site#: GROUNDWATER
Site Location: ORIGINAL LANDFILL
Your C.O.C. #: 678158-01-01, 678158-01-02

Report Date: 2022/12/23

Report #: R3281972

Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT**BUREAU VERITAS JOB #: C291539****Received: 2022/11/19, 10:21**

Sample Matrix: Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	1	N/A	2022/11/21	BBY6SOP-00026	SM 23 2320 B m
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	9	N/A	2022/11/22	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	10	N/A	2022/11/21	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO ₄ -E m
Conductivity @25C	10	N/A	2022/11/21	BBY6SOP-00026	SM 23 2510 B m
Sulphide (as H ₂ S)	10	N/A	2022/11/23	BBY WI-00033	Auto Calc
Un-ionized Hydrogen Sulphide as S Calc	10	N/A	2022/11/23	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃)	10	N/A	2022/11/22	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CV (2)	10	2022/11/25	2022/11/25	AB SOP-00084	BCMOE BCLM Oct2013 m
EPH in Water when PAH required	10	2022/11/21	2022/11/21	BBY8SOP-00029	BCMOE BCLM Sep2017 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	10	N/A	2022/11/22	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (2)	10	N/A	2022/11/21	BBY7SOP-00002	EPA 6020b R2 m
Ammonia-N (Total)	10	N/A	2022/11/21	AB SOP-00007	SM 23 4500 NH ₃ A G m
Nitrate + Nitrite (N)	10	N/A	2022/11/22	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrite (N) by CFA	10	N/A	2022/11/22	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	10	N/A	2022/11/22	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	3	2022/11/21	2022/11/22	BBY8SOP-00021	BCMOE BCLM Jul2017m
PAH in Water by GC/MS (SIM)	7	2022/11/21	2022/11/23	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (3)	10	N/A	2022/11/23	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	10	N/A	2022/11/19	BBY7 WI-00004	SM 23 3030B m
Orthophosphate by Konelab (4)	10	N/A	2022/11/22	BBY6SOP-00013	SM 23 4500-P E m
Total Sulphide (1)	10	N/A	2022/11/23	AB SOP-00080	SM 23 4500 S ₂ -A D Fm
Total Dissolved Solids (Filt. Residue)	7	2022/11/23	2022/11/24	BBY6SOP-00033	SM 23 2540 C m
Total Dissolved Solids (Filt. Residue)	3	2022/11/23	2022/11/25	BBY6SOP-00033	SM 23 2540 C m
EPH less PAH in Water by GC/FID (5)	10	N/A	2022/11/23	BBY WI-00033	Auto Calc
Field pH	10	N/A	2022/11/19		
Field Temperature	10	N/A	2022/11/19		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.



Attention: Aïresse MacPhee

GHD Limited
455 PHILLIP STREET
WATERLOO, ON
CANADA N2L 3X2

Your P.O. #: 735-004088
Your Project #: 11222680 - ORIGINAL LANDFILL
Site#: GROUNDWATER
Site Location: ORIGINAL LANDFILL
Your C.O.C. #: 678158-01-01, 678158-01-02

Report Date: 2022/12/23
Report #: R3281972
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C291539

Received: 2022/11/19, 10:21

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8

(2) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.

(3) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b,j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

(4) Orthophosphate > Total Phosphorus Imbalance: When applicable, Orthophosphate, Total Phosphorus and dissolved Phosphorus results were reviewed and data quality meets acceptable levels unless otherwise noted.

(5) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Brody Andersen, B.Sc., B.Sc., Program Specialist—Emergency Spill Response

Email: Brody.Andersen@bureauveritas.com

Phone# (780)577-7120

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Raphael Kwan, Senior Manager, BC and Yukon Regions responsible for British Columbia Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BHI280	BHI280			BHI281		
Sampling Date		2022/11/16 10:37	2022/11/16 10:37			2022/11/16 11:30		
COC Number		678158-01-01	678158-01-01			678158-01-01		
	UNITS	WG-11222680-161122 -CXW-01	WG-11222680-161122 -CXW-01 Lab-Dup	RDL	QC Batch	WG-11222680-161122 -CXW-02	RDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.0050	N/A	0.0050	A806294	0.0107	0.0050	A806294

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.781	N/A	0.020	A803349	0.267	0.020	A803349
Sulphide (as H2S)	mg/L	<0.019	N/A	0.019	A803329	<0.0019	0.0019	A803329

Field Parameters

Field pH	pH	7.32	N/A	N/A	ONSITE	7.55	N/A	ONSITE
Field Temperature	°C	13.05	N/A	N/A	ONSITE	11.84	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	310	N/A	2.0	A806616	1200	2.0	A823696
Total Dissolved Solids	mg/L	190	180	10	A806440	930	10	A806440

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	N/A	1.0	A806613	<1.0	1.0	A806738
Alkalinity (Total as CaCO3)	mg/L	150	N/A	1.0	A806613	99	1.0	A806738
Bicarbonate (HCO3)	mg/L	180	N/A	1.0	A806613	120	1.0	A806738
Carbonate (CO3)	mg/L	<1.0	N/A	1.0	A806613	<1.0	1.0	A806738
Hydroxide (OH)	mg/L	<1.0	N/A	1.0	A806613	<1.0	1.0	A806738
Total Sulphide	mg/L	<0.018 (1)	N/A	0.018	A807412	<0.0018	0.0018	A807412
Chloride (Cl)	mg/L	1.6	N/A	1.0	A805382	65	1.0	A805382
Sulphate (SO4)	mg/L	5.5	N/A	1.0	A805382	400	5.0	A805382

Nutrients

Total Ammonia (N)	mg/L	0.037	N/A	0.015	A804708	0.023	0.015	A804708
Orthophosphate (P)	mg/L	0.0084	N/A	0.0030	A806249	0.0071	0.0030	A806249
Nitrate plus Nitrite (N)	mg/L	0.781	N/A	0.020	A806292	0.278	0.020	A806292

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) Detection limits raised due to sample matrix.



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BHI282			BHI283	BHI284		
Sampling Date		2022/11/16 11:32			2022/11/16 12:20	2022/11/16 13:45		
COC Number		678158-01-01			678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-03	RDL	QC Batch	WG-11222680-161122 -CXW-04	WG-11222680-161122 -CXW-05	RDL	QC Batch

ANIONS

Nitrite (N)	mg/L	0.0114	0.0050	A806294	<0.0050	<0.0050	0.0050	A806294

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.266	0.020	A803349	0.612	0.322	0.020	A803349
Sulphide (as H2S)	mg/L	<0.0019	0.0019	A803329	<0.0019	<0.0019	0.0019	A803329

Field Parameters

Field pH	pH	7.55	N/A	ONSITE	7.61	7.47	N/A	ONSITE
Field Temperature	°C	11.84	N/A	ONSITE	9.70	10.90	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	1200	2.0	A823696	180	160	2.0	A823696
Total Dissolved Solids	mg/L	940	10	A806440	90	90	10	A806440

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	1.0	A806738	<1.0	<1.0	1.0	A806738
Alkalinity (Total as CaCO3)	mg/L	100	1.0	A806738	83	60	1.0	A806738
Bicarbonate (HCO3)	mg/L	120	1.0	A806738	100	73	1.0	A806738
Carbonate (CO3)	mg/L	<1.0	1.0	A806738	<1.0	<1.0	1.0	A806738
Hydroxide (OH)	mg/L	<1.0	1.0	A806738	<1.0	<1.0	1.0	A806738
Total Sulphide	mg/L	<0.0018	0.0018	A807412	<0.0018	<0.0018	0.0018	A807412
Chloride (Cl)	mg/L	69	1.0	A805382	11	6.5	1.0	A805382
Sulphate (SO4)	mg/L	420	5.0	A805382	4.6	6.4	1.0	A805382

Nutrients

Total Ammonia (N)	mg/L	0.020	0.015	A804709	<0.015	<0.015	0.015	A804708
Orthophosphate (P)	mg/L	0.0067	0.0030	A806249	0.0065	0.0037	0.0030	A806249
Nitrate plus Nitrite (N)	mg/L	0.278	0.020	A806292	0.612	0.322	0.020	A806292

RDL = Reportable Detection Limit

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BHI285	BHI286		BHI287		
Sampling Date		2022/11/16 13:55	2022/11/16 14:55		2022/11/16 15:47		
COC Number		678158-01-01	678158-01-01		678158-01-01		
	UNITS	WG-11222680-161122 -CXW-06	WG-11222680-161122 -CXW-07	QC Batch	WG-11222680-161122 -CXW-08	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.0050	<0.0050	A806294	<0.0050	0.0050	A806294
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.055	0.784	A803349	0.323	0.020	A803349
Sulphide (as H2S)	mg/L	<0.0019	<0.0019	A803329	<0.0019	0.0019	A803329
Field Parameters							
Field pH	pH	7.86	7.19	ONSITE	7.73	N/A	ONSITE
Field Temperature	°C	11.06	9.68	ONSITE	10.78	N/A	ONSITE
Misc. Inorganics							
Conductivity	uS/cm	83	110	A823696	110	2.0	A823696
Total Dissolved Solids	mg/L	44	56	A806440	74	10	A807429
Anions							
Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	A806738	<1.0	1.0	A806738
Alkalinity (Total as CaCO3)	mg/L	39	35	A806738	52	1.0	A806738
Bicarbonate (HCO3)	mg/L	47	42	A806738	63	1.0	A806738
Carbonate (CO3)	mg/L	<1.0	<1.0	A806738	<1.0	1.0	A806738
Hydroxide (OH)	mg/L	<1.0	<1.0	A806738	<1.0	1.0	A806738
Total Sulphide	mg/L	<0.0018	<0.0018 (1)	A807412	<0.0018	0.0018	A807412
Chloride (Cl)	mg/L	<1.0	3.7	A805382	2.0	1.0	A805382
Sulphate (SO4)	mg/L	2.7	8.3	A805382	2.3	1.0	A805382
Nutrients							
Total Ammonia (N)	mg/L	<0.015	<0.015	A804709	<0.015	0.015	A804708
Orthophosphate (P)	mg/L	0.027	0.0055	A806249	0.0034	0.0030	A806249
Nitrate plus Nitrite (N)	mg/L	0.055	0.784	A806292	0.323	0.020	A806292
RDL = Reportable Detection Limit							
N/A = Not Applicable							
(1) Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely.							



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BHI288	BHI288		BHI289		
Sampling Date		2022/11/17 08:25	2022/11/17 08:25		2022/11/17 08:40		
COC Number		678158-01-01	678158-01-01		678158-01-01		
	UNITS	WG-11222680-171122 -CXW-09	WG-11222680-171122 -CXW-09 Lab-Dup	QC Batch	WG-11222680-171122 -CXW-10	RDL	QC Batch

ANIONS

Nitrite (N)	mg/L	<0.0050	N/A	A806294	<0.0050	0.0050	A806299

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.063	N/A	A803349	0.616	0.020	A803349
Sulphide (as H2S)	mg/L	<0.0019	N/A	A803329	<0.0019	0.0019	A803329

Field Parameters

Field pH	pH	6.36	N/A	ONSITE	6.73	N/A	ONSITE
Field Temperature	°C	14.02	N/A	ONSITE	8.87	N/A	ONSITE

Misc. Inorganics

Conductivity	uS/cm	81	80	A823696	480	2.0	A823696
Total Dissolved Solids	mg/L	42	N/A	A807429	320	10	A807429

Anions

Alkalinity (PP as CaCO3)	mg/L	<1.0	<1.0	A806738	<1.0	1.0	A806738
Alkalinity (Total as CaCO3)	mg/L	38	37	A806738	88	1.0	A806738
Bicarbonate (HCO3)	mg/L	46	46	A806738	110	1.0	A806738
Carbonate (CO3)	mg/L	<1.0	<1.0	A806738	<1.0	1.0	A806738
Hydroxide (OH)	mg/L	<1.0	<1.0	A806738	<1.0	1.0	A806738
Total Sulphide	mg/L	<0.0018	N/A	A807412	<0.0018	0.0018	A807412
Chloride (Cl)	mg/L	<1.0	N/A	A805382	79	1.0	A805382
Sulphate (SO4)	mg/L	2.2	N/A	A805382	5.1	1.0	A805382

Nutrients

Total Ammonia (N)	mg/L	<0.015	N/A	A804709	<0.015	0.015	A804708
Orthophosphate (P)	mg/L	0.0045	N/A	A806249	0.0055	0.0030	A806249
Nitrate plus Nitrite (N)	mg/L	0.063	N/A	A806292	0.616	0.020	A806297

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

RESULTS OF CHEMICAL ANALYSES OF WATER

Bureau Veritas ID		BHI289		
Sampling Date		2022/11/17 08:40		
COC Number		678158-01-01		
	UNITS	WG-11222680-171122 -CXW-10 Lab-Dup	RDL	QC Batch

ANIONS				
Nitrite (N)	mg/L	<0.0050	0.0050	A806299
Nutrients				
Nitrate plus Nitrite (N)	mg/L	0.617	0.020	A806297
RDL = Reportable Detection Limit				
Lab-Dup = Laboratory Initiated Duplicate				



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

MISCELLANEOUS (WATER)

Bureau Veritas ID		BHI280	BHI281	BHI282		
Sampling Date		2022/11/16 10:37	2022/11/16 11:30	2022/11/16 11:32		
COC Number		678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-01	WG-11222680-161122 -CXW-02	WG-11222680-161122 -CXW-03	RDL	QC Batch

Calculated Parameters

Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	A803331
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	A803331

RDL = Reportable Detection Limit

Bureau Veritas ID		BHI283	BHI284	BHI285		
Sampling Date		2022/11/16 12:20	2022/11/16 13:45	2022/11/16 13:55		
COC Number		678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-04	WG-11222680-161122 -CXW-05	WG-11222680-161122 -CXW-06	RDL	QC Batch

Calculated Parameters

Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	A803331
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	A803331

RDL = Reportable Detection Limit

Bureau Veritas ID		BHI286	BHI287	BHI288		
Sampling Date		2022/11/16 14:55	2022/11/16 15:47	2022/11/17 08:25		
COC Number		678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-07	WG-11222680-161122 -CXW-08	WG-11222680-171122 -CXW-09	RDL	QC Batch

Calculated Parameters

Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	A803331
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	<0.0050	<0.0050	0.0050	A803331

RDL = Reportable Detection Limit

Bureau Veritas ID		BHI289		
Sampling Date		2022/11/17 08:40		
COC Number		678158-01-01		
	UNITS	WG-11222680-171122 -CXW-10	RDL	QC Batch

Calculated Parameters

Total Un-ionized Hydrogen Sulfide as S	mg/L	<0.0050	0.0050	A803331
Total Un-ionized Hydrogen Sulfide as H2S	mg/L	<0.0050	0.0050	A803331

RDL = Reportable Detection Limit



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Bureau Veritas ID		BHI280	BHI281	BHI282	BHI283		
Sampling Date		2022/11/16 10:37	2022/11/16 11:30	2022/11/16 11:32	2022/11/16 12:20		
COC Number		678158-01-01	678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-01	WG-11222680-161122 -CXW-02	WG-11222680-161122 -CXW-03	WG-11222680-161122 -CXW-04	RDL	QC Batch

Calculated Parameters

Low Molecular Weight PAH's	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A803355
High Molecular Weight PAH's	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A803355
Total PAH	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A803355

Polycyclic Aromatics

Quinoline	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	A804591
Naphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A804591
1-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A804591
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Acenaphthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Fluorene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Phenanthrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	A804591
Acridine	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Fluoranthene	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	A804591
Pyrene	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	A804591
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	A804591
Chrysene	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	A804591
Benzo(b,j)fluoranthene	ug/L	<0.030	<0.030	<0.030	<0.030	0.030	A804591
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	A804591
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Dibenz(a,h)anthracene	ug/L	<0.0030	<0.0030	<0.0030	<0.0030	0.0030	A804591
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591

Calculated Parameters

LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	A803364
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	A803364

Ext. Pet. Hydrocarbon

EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	A804600
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	A804600

RDL = Reportable Detection Limit



**BUREAU
VERITAS**

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Bureau Veritas ID		BHI280	BHI281	BHI282	BHI283		
Sampling Date		2022/11/16 10:37	2022/11/16 11:30	2022/11/16 11:32	2022/11/16 12:20		
COC Number		678158-01-01	678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-01	WG-11222680-161122 -CXW-02	WG-11222680-161122 -CXW-03	WG-11222680-161122 -CXW-04	RDL	QC Batch

Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	98	98	97	98	N/A	A804600
D10-ANTHRACENE (sur.)	%	91	88	88	91	N/A	A804591
D8-ACENAPHTHYLENE (sur.)	%	96	93	93	95	N/A	A804591
D8-NAPHTHALENE (sur.)	%	82	68	70	77	N/A	A804591
TERPHENYL-D14 (sur.)	%	90	82	84	86	N/A	A804591

RDL = Reportable Detection Limit

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Bureau Veritas ID		BHI284	BHI285	BHI286	BHI287		
Sampling Date		2022/11/16 13:45	2022/11/16 13:55	2022/11/16 14:55	2022/11/16 15:47		
COC Number		678158-01-01	678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-05	WG-11222680-161122 -CXW-06	WG-11222680-161122 -CXW-07	WG-11222680-161122 -CXW-08	RDL	QC Batch

Calculated Parameters

Low Molecular Weight PAH's	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A803355
High Molecular Weight PAH's	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A803355
Total PAH	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A803355

Polycyclic Aromatics

Quinoline	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	A804591
Naphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A804591
1-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A804591
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Acenaphthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Fluorene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Phenanthrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	A804591
Acridine	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Fluoranthene	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	A804591
Pyrene	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	A804591
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	A804591
Chrysene	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	A804591
Benzo(b,j)fluoranthene	ug/L	<0.030	<0.030	<0.030	<0.030	0.030	A804591
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	A804591
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591
Dibenz(a,h)anthracene	ug/L	<0.0030	<0.0030	<0.0030	<0.0030	0.0030	A804591
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	A804591

Calculated Parameters

LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	A803364
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	A803364

Ext. Pet. Hydrocarbon

EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	A804600
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	A804600

RDL = Reportable Detection Limit



**BUREAU
VERITAS**

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Bureau Veritas ID		BHI284	BHI285	BHI286	BHI287		
Sampling Date		2022/11/16 13:45	2022/11/16 13:55	2022/11/16 14:55	2022/11/16 15:47		
COC Number		678158-01-01	678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-05	WG-11222680-161122 -CXW-06	WG-11222680-161122 -CXW-07	WG-11222680-161122 -CXW-08	RDL	QC Batch

Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	100	101	100	100	N/A	A804600
D10-ANTHRACENE (sur.)	%	90	90	91	90	N/A	A804591
D8-ACENAPHTHYLENE (sur.)	%	95	94	94	94	N/A	A804591
D8-NAPHTHALENE (sur.)	%	79	81	81	80	N/A	A804591
TERPHENYL-D14 (sur.)	%	86	86	85	87	N/A	A804591

RDL = Reportable Detection Limit

N/A = Not Applicable



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Bureau Veritas ID		BHI288	BHI289		
Sampling Date		2022/11/17 08:25	2022/11/17 08:40		
COC Number		678158-01-01	678158-01-01		
	UNITS	WG-11222680-171122 -CXW-09	WG-11222680-171122 -CXW-10	RDL	QC Batch
Calculated Parameters					
Low Molecular Weight PAH's	ug/L	<0.10	<0.10	0.10	A803355
High Molecular Weight PAH's	ug/L	<0.050	<0.050	0.050	A803355
Total PAH	ug/L	<0.10	<0.10	0.10	A803355
Polycyclic Aromatics					
Quinoline	ug/L	<0.020	<0.020	0.020	A804591
Naphthalene	ug/L	<0.10	<0.10	0.10	A804591
1-Methylnaphthalene	ug/L	<0.050	<0.050	0.050	A804591
2-Methylnaphthalene	ug/L	<0.10	<0.10	0.10	A804591
Acenaphthylene	ug/L	<0.050	<0.050	0.050	A804591
Acenaphthene	ug/L	<0.050	<0.050	0.050	A804591
Fluorene	ug/L	<0.050	<0.050	0.050	A804591
Phenanthrene	ug/L	<0.050	<0.050	0.050	A804591
Anthracene	ug/L	<0.010	<0.010	0.010	A804591
Acridine	ug/L	<0.050	<0.050	0.050	A804591
Fluoranthene	ug/L	<0.020	<0.020	0.020	A804591
Pyrene	ug/L	<0.020	<0.020	0.020	A804591
Benzo(a)anthracene	ug/L	<0.010	<0.010	0.010	A804591
Chrysene	ug/L	<0.020	<0.020	0.020	A804591
Benzo(b&j)fluoranthene	ug/L	<0.030	<0.030	0.030	A804591
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	0.050	A804591
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	0.0050	A804591
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	0.050	A804591
Dibenz(a,h)anthracene	ug/L	<0.0030	<0.0030	0.0030	A804591
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	0.050	A804591
Calculated Parameters					
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	0.20	A803364
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	0.20	A803364
Ext. Pet. Hydrocarbon					
EPH (C10-C19)	mg/L	<0.20	<0.20	0.20	A804600
EPH (C19-C32)	mg/L	<0.20	<0.20	0.20	A804600
RDL = Reportable Detection Limit					



**BUREAU
VERITAS**

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Bureau Veritas ID		BHI288	BHI289		
Sampling Date		2022/11/17 08:25	2022/11/17 08:40		
COC Number		678158-01-01	678158-01-01		
	UNITS	WG-11222680-171122 -CXW-09	WG-11222680-171122 -CXW-10	RDL	QC Batch
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	100	100	N/A	A804600
D10-ANTHRACENE (sur.)	%	90	91	N/A	A804591
D8-ACENAPHTHYLENE (sur.)	%	93	95	N/A	A804591
D8-NAPHTHALENE (sur.)	%	81	82	N/A	A804591
TERPHENYL-D14 (sur.)	%	85	87	N/A	A804591
RDL = Reportable Detection Limit					
N/A = Not Applicable					



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI280	BHI281	BHI282	BHI283		
Sampling Date		2022/11/16 10:37	2022/11/16 11:30	2022/11/16 11:32	2022/11/16 12:20		
COC Number		678158-01-01	678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-01	WG-11222680-161122 -CXW-02	WG-11222680-161122 -CXW-03	WG-11222680-161122 -CXW-04	RDL	QC Batch

Calculated Parameters

Dissolved Hardness (CaCO3)	mg/L	149	638	623	79.3	0.50	A803334

Elements

Dissolved Mercury (Hg)	ug/L	<0.0019	0.0319	0.0313	<0.0019	0.0019	A809432

Dissolved Metals by ICPMS

Dissolved Aluminum (Al)	ug/L	39.3	<3.0	<3.0	3.0	3.0	A803749
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	A803749
Dissolved Arsenic (As)	ug/L	0.18	1.00	1.01	<0.10	0.10	A803749
Dissolved Barium (Ba)	ug/L	9.6	25.5	25.7	4.5	1.0	A803749
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A803749
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	A803749
Dissolved Boron (B)	ug/L	<50	<50	<50	<50	50	A803749
Dissolved Cadmium (Cd)	ug/L	<0.010	0.022	0.020	<0.010	0.010	A803749
Dissolved Chromium (Cr)	ug/L	1.0	<1.0	<1.0	<1.0	1.0	A803749
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	A803749
Dissolved Copper (Cu)	ug/L	0.34	7.66	7.62	<0.20	0.20	A803749
Dissolved Iron (Fe)	ug/L	43.8	<5.0	<5.0	<5.0	5.0	A803749
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	A803749
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	A803749
Dissolved Manganese (Mn)	ug/L	2.2	<1.0	<1.0	13.0	1.0	A803749
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	A803749
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	1.1	<1.0	1.0	A803749
Dissolved Phosphorus (P)	ug/L	<10	16	14	<10	10	A803749
Dissolved Selenium (Se)	ug/L	0.17	0.11	<0.10	<0.10	0.10	A803749
Dissolved Silicon (Si)	ug/L	9450	7000	6960	7480	100	A803749
Dissolved Silver (Ag)	ug/L	<0.020	0.049	0.048	<0.020	0.020	A803749
Dissolved Strontium (Sr)	ug/L	70.7	292	303	33.3	1.0	A803749
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	A803749
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	A803749
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	A803749
Dissolved Uranium (U)	ug/L	0.11	0.50	0.50	<0.10	0.10	A803749
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	A803749

RDL = Reportable Detection Limit



**BUREAU
VERITAS**

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI280	BHI281	BHI282	BHI283		
Sampling Date		2022/11/16 10:37	2022/11/16 11:30	2022/11/16 11:32	2022/11/16 12:20		
COC Number		678158-01-01	678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-01	WG-11222680-161122 -CXW-02	WG-11222680-161122 -CXW-03	WG-11222680-161122 -CXW-04	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	A803749
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A803749
Dissolved Calcium (Ca)	mg/L	47.3	207	202	25.3	0.050	A803341
Dissolved Magnesium (Mg)	mg/L	7.41	29.3	28.6	3.93	0.050	A803341
Dissolved Potassium (K)	mg/L	0.523	0.895	0.884	0.331	0.050	A803341
Dissolved Sodium (Na)	mg/L	8.55	15.7	15.5	5.63	0.050	A803341
Dissolved Sulphur (S)	mg/L	<3.0	151	145	<3.0	3.0	A803341
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI284	BHI285	BHI286	BHI287		
Sampling Date		2022/11/16 13:45	2022/11/16 13:55	2022/11/16 14:55	2022/11/16 15:47		
COC Number		678158-01-01	678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-05	WG-11222680-161122 -CXW-06	WG-11222680-161122 -CXW-07	WG-11222680-161122 -CXW-08	RDL	QC Batch

Calculated Parameters							
Dissolved Hardness (CaCO ₃)	mg/L	65.2	37.1	35.3	51.4	0.50	A803334
Elements							
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	<0.0019	0.0019	A809432
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	<3.0	3.8	<3.0	<3.0	3.0	A803749
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	A803749
Dissolved Arsenic (As)	ug/L	<0.10	0.83	<0.10	<0.10	0.10	A803749
Dissolved Barium (Ba)	ug/L	1.9	2.2	1.0	<1.0	1.0	A803749
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A803749
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	A803749
Dissolved Boron (B)	ug/L	<50	<50	<50	<50	50	A803749
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	A803749
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	A803749
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	A803749
Dissolved Copper (Cu)	ug/L	0.21	<0.20	<0.20	<0.20	0.20	A803749
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	A803749
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	A803749
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	A803749
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	A803749
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	A803749
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	A803749
Dissolved Phosphorus (P)	ug/L	<10	20	<10	<10	10	A803749
Dissolved Selenium (Se)	ug/L	0.11	<0.10	0.19	<0.10	0.10	A803749
Dissolved Silicon (Si)	ug/L	6110	3500	6440	3640	100	A803749
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	A803749
Dissolved Strontium (Sr)	ug/L	33.0	14.7	22.1	23.3	1.0	A803749
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	A803749
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	A803749
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	A803749
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A803749
Dissolved Vanadium (V)	ug/L	<5.0	6.7	<5.0	<5.0	5.0	A803749

RDL = Reportable Detection Limit



**BUREAU
VERITAS**

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI284	BHI285	BHI286	BHI287		
Sampling Date		2022/11/16 13:45	2022/11/16 13:55	2022/11/16 14:55	2022/11/16 15:47		
COC Number		678158-01-01	678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-161122 -CXW-05	WG-11222680-161122 -CXW-06	WG-11222680-161122 -CXW-07	WG-11222680-161122 -CXW-08	RDL	QC Batch
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	A803749
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	A803749
Dissolved Calcium (Ca)	mg/L	20.6	12.1	10.4	17.1	0.050	A803341
Dissolved Magnesium (Mg)	mg/L	3.36	1.66	2.28	2.10	0.050	A803341
Dissolved Potassium (K)	mg/L	0.240	0.181	0.166	0.169	0.050	A803341
Dissolved Sodium (Na)	mg/L	4.05	1.04	6.27	1.25	0.050	A803341
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	3.6	<3.0	3.0	A803341
RDL = Reportable Detection Limit							



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI288	BHI289	BHI289		
Sampling Date		2022/11/17 08:25	2022/11/17 08:40	2022/11/17 08:40		
COC Number		678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-171122 -CXW-09	WG-11222680-171122 -CXW-10	WG-11222680-171122 -CXW-10 Lab-Dup	RDL	QC Batch

Calculated Parameters						
Dissolved Hardness (CaCO ₃)	mg/L	36.7	180	N/A	0.50	A803334
Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	N/A	0.0019	A809432
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	4.2	6.4	6.7	3.0	A803753
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	A803753
Dissolved Arsenic (As)	ug/L	0.13	0.21	0.19	0.10	A803753
Dissolved Barium (Ba)	ug/L	1.6	20.6	20.2	1.0	A803753
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	A803753
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	A803753
Dissolved Boron (B)	ug/L	<50	<50	<50	50	A803753
Dissolved Cadmium (Cd)	ug/L	<0.010	0.014	0.014	0.010	A803753
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	A803753
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	<0.20	0.20	A803753
Dissolved Copper (Cu)	ug/L	<0.20	1.23	1.25	0.20	A803753
Dissolved Iron (Fe)	ug/L	<5.0	<5.0	<5.0	5.0	A803753
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	A803753
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	A803753
Dissolved Manganese (Mn)	ug/L	<1.0	34.5	34.0	1.0	A803753
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	A803753
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	A803753
Dissolved Phosphorus (P)	ug/L	<10	<10	<10	10	A803753
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	<0.10	0.10	A803753
Dissolved Silicon (Si)	ug/L	3970	13600	13900	100	A803753
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	A803753
Dissolved Strontium (Sr)	ug/L	16.9	103	103	1.0	A803753
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	A803753
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	A803753
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	A803753
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Bureau Veritas ID		BHI288	BHI289	BHI289		
Sampling Date		2022/11/17 08:25	2022/11/17 08:40	2022/11/17 08:40		
COC Number		678158-01-01	678158-01-01	678158-01-01		
	UNITS	WG-11222680-171122 -CXW-09	WG-11222680-171122 -CXW-10	WG-11222680-171122 -CXW-10 Lab-Dup	RDL	QC Batch
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	A803753
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	A803753
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	A803753
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	A803753
Dissolved Calcium (Ca)	mg/L	12.4	45.3	N/A	0.050	A803341
Dissolved Magnesium (Mg)	mg/L	1.38	16.3	N/A	0.050	A803341
Dissolved Potassium (K)	mg/L	0.200	1.08	N/A	0.050	A803341
Dissolved Sodium (Na)	mg/L	1.01	23.5	N/A	0.050	A803341
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	N/A	3.0	A803341
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						



GENERAL COMMENTS

Version 4: Report reissued with updated note for SIDE as per client request. 20221223

Version 3: Report reissued to include results for EC as per the original COC.

Version 2: Report reissued to amend client sample IDs as per the original COC.

Sample BHI280 [WG-11222680-161122-CXW-01] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample BHI281 [WG-11222680-161122-CXW-02] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample BHI282 [WG-11222680-161122-CXW-03] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample BHI283 [WG-11222680-161122-CXW-04] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample BHI284 [WG-11222680-161122-CXW-05] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample BHI285 [WG-11222680-161122-CXW-06] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample BHI286 [WG-11222680-161122-CXW-07] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample BHI287 [WG-11222680-161122-CXW-08] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample BHI288 [WG-11222680-171122-CXW-09] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Sample BHI289 [WG-11222680-171122-CXW-10] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

Results relate only to the items tested.



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VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

QUALITY ASSURANCE REPORT

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A804591	D10-ANTHRACENE (sur.)	2022/11/22	91	50 - 140	94	50 - 140	88	%		
A804591	D8-ACENAPHTHYLENE (sur.)	2022/11/22	99	50 - 140	100	50 - 140	94	%		
A804591	D8-NAPHTHALENE (sur.)	2022/11/22	89	50 - 140	90	50 - 140	80	%		
A804591	TERPHENYL-D14 (sur.)	2022/11/22	90	50 - 140	90	50 - 140	81	%		
A804600	O-TERPHENYL (sur.)	2022/11/21	99	60 - 140	85	60 - 140	98	%		
A803749	Dissolved Aluminum (Al)	2022/11/21	100	80 - 120	103	80 - 120	<3.0	ug/L	NC (1)	20
A803749	Dissolved Antimony (Sb)	2022/11/21	103	80 - 120	105	80 - 120	<0.50	ug/L	0.87 (1)	20
A803749	Dissolved Arsenic (As)	2022/11/21	103	80 - 120	103	80 - 120	<0.10	ug/L	0.93 (1)	20
A803749	Dissolved Barium (Ba)	2022/11/21	NC	80 - 120	101	80 - 120	<1.0	ug/L	0.78 (1)	20
A803749	Dissolved Beryllium (Be)	2022/11/21	92	80 - 120	97	80 - 120	<0.10	ug/L	NC (1)	20
A803749	Dissolved Bismuth (Bi)	2022/11/21	92	80 - 120	100	80 - 120	<1.0	ug/L	NC (1)	20
A803749	Dissolved Boron (B)	2022/11/21	95	80 - 120	99	80 - 120	<50	ug/L	0.82 (1)	20
A803749	Dissolved Cadmium (Cd)	2022/11/21	98	80 - 120	101	80 - 120	<0.010	ug/L	1.4 (1)	20
A803749	Dissolved Chromium (Cr)	2022/11/21	99	80 - 120	102	80 - 120	<1.0	ug/L	NC (1)	20
A803749	Dissolved Cobalt (Co)	2022/11/21	92	80 - 120	97	80 - 120	<0.20	ug/L	2.8 (1)	20
A803749	Dissolved Copper (Cu)	2022/11/21	92	80 - 120	100	80 - 120	<0.20	ug/L	1.2 (1)	20
A803749	Dissolved Iron (Fe)	2022/11/21	102	80 - 120	101	80 - 120	<5.0	ug/L	2.7 (1)	20
A803749	Dissolved Lead (Pb)	2022/11/21	96	80 - 120	102	80 - 120	<0.20	ug/L	NC (1)	20
A803749	Dissolved Lithium (Li)	2022/11/21	88	80 - 120	92	80 - 120	<2.0	ug/L	NC (1)	20
A803749	Dissolved Manganese (Mn)	2022/11/21	NC	80 - 120	99	80 - 120	<1.0	ug/L	2.6 (1)	20
A803749	Dissolved Molybdenum (Mo)	2022/11/21	105	80 - 120	102	80 - 120	<1.0	ug/L	NC (1)	20
A803749	Dissolved Nickel (Ni)	2022/11/21	94	80 - 120	100	80 - 120	<1.0	ug/L	0.64 (1)	20
A803749	Dissolved Phosphorus (P)	2022/11/21	100	80 - 120	100	80 - 120	<10	ug/L		
A803749	Dissolved Selenium (Se)	2022/11/21	106	80 - 120	107	80 - 120	<0.10	ug/L	1.7 (1)	20
A803749	Dissolved Silicon (Si)	2022/11/21	NC	80 - 120	105	80 - 120	<100	ug/L	2.5 (1)	20
A803749	Dissolved Silver (Ag)	2022/11/21	98	80 - 120	100	80 - 120	<0.020	ug/L	NC (1)	20
A803749	Dissolved Strontium (Sr)	2022/11/21	NC	80 - 120	97	80 - 120	<1.0	ug/L	0.073 (1)	20
A803749	Dissolved Thallium (Tl)	2022/11/21	97	80 - 120	100	80 - 120	<0.010	ug/L	6.8 (1)	20
A803749	Dissolved Tin (Sn)	2022/11/21	101	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A803749	Dissolved Titanium (Ti)	2022/11/21	97	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20
A803749	Dissolved Uranium (U)	2022/11/21	99	80 - 120	100	80 - 120	<0.10	ug/L	0.99 (1)	20



**BUREAU
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Bureau Veritas Job #: C291539

Report Date: 2022/12/23

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A803749	Dissolved Vanadium (V)	2022/11/21	100	80 - 120	100	80 - 120	<5.0	ug/L	NC (1)	20
A803749	Dissolved Zinc (Zn)	2022/11/21	95	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20
A803749	Dissolved Zirconium (Zr)	2022/11/21	103	80 - 120	102	80 - 120	<0.10	ug/L	2.4 (1)	20
A803753	Dissolved Aluminum (Al)	2022/11/21	100 (2)	80 - 120	104	80 - 120	<3.0	ug/L	4.5 (3)	20
A803753	Dissolved Antimony (Sb)	2022/11/21	105 (2)	80 - 120	105	80 - 120	<0.50	ug/L	NC (3)	20
A803753	Dissolved Arsenic (As)	2022/11/21	104 (2)	80 - 120	102	80 - 120	<0.10	ug/L	12 (3)	20
A803753	Dissolved Barium (Ba)	2022/11/21	97 (2)	80 - 120	100	80 - 120	<1.0	ug/L	1.6 (3)	20
A803753	Dissolved Beryllium (Be)	2022/11/21	99 (2)	80 - 120	98	80 - 120	<0.10	ug/L	NC (3)	20
A803753	Dissolved Bismuth (Bi)	2022/11/21	96 (2)	80 - 120	98	80 - 120	<1.0	ug/L	NC (3)	20
A803753	Dissolved Boron (B)	2022/11/21	101 (2)	80 - 120	102	80 - 120	<50	ug/L	NC (3)	20
A803753	Dissolved Cadmium (Cd)	2022/11/21	101 (2)	80 - 120	100	80 - 120	<0.010	ug/L	2.1 (3)	20
A803753	Dissolved Chromium (Cr)	2022/11/21	100 (2)	80 - 120	103	80 - 120	<1.0	ug/L	NC (3)	20
A803753	Dissolved Cobalt (Co)	2022/11/21	93 (2)	80 - 120	97	80 - 120	<0.20	ug/L	NC (3)	20
A803753	Dissolved Copper (Cu)	2022/11/21	94 (2)	80 - 120	101	80 - 120	<0.20	ug/L	1.2 (3)	20
A803753	Dissolved Iron (Fe)	2022/11/21	104 (2)	80 - 120	102	80 - 120	<5.0	ug/L	NC (3)	20
A803753	Dissolved Lead (Pb)	2022/11/21	99 (2)	80 - 120	99	80 - 120	<0.20	ug/L	NC (3)	20
A803753	Dissolved Lithium (Li)	2022/11/21	92 (2)	80 - 120	92	80 - 120	<2.0	ug/L	NC (3)	20
A803753	Dissolved Manganese (Mn)	2022/11/21	93 (2)	80 - 120	99	80 - 120	<1.0	ug/L	1.4 (3)	20
A803753	Dissolved Molybdenum (Mo)	2022/11/21	102 (2)	80 - 120	102	80 - 120	<1.0	ug/L	NC (3)	20
A803753	Dissolved Nickel (Ni)	2022/11/21	95 (2)	80 - 120	101	80 - 120	<1.0	ug/L	NC (3)	20
A803753	Dissolved Phosphorus (P)	2022/11/21	102 (2)	80 - 120	101	80 - 120	<10	ug/L	NC (3)	20
A803753	Dissolved Selenium (Se)	2022/11/21	106 (2)	80 - 120	106	80 - 120	<0.10	ug/L	NC (3)	20
A803753	Dissolved Silicon (Si)	2022/11/21	NC (2)	80 - 120	107	80 - 120	<100	ug/L	1.8 (3)	20
A803753	Dissolved Silver (Ag)	2022/11/21	102 (2)	80 - 120	99	80 - 120	<0.020	ug/L	NC (3)	20
A803753	Dissolved Strontium (Sr)	2022/11/21	NC (2)	80 - 120	97	80 - 120	<1.0	ug/L	0.31 (3)	20
A803753	Dissolved Thallium (Tl)	2022/11/21	99 (2)	80 - 120	99	80 - 120	<0.010	ug/L	NC (3)	20
A803753	Dissolved Tin (Sn)	2022/11/21	103 (2)	80 - 120	103	80 - 120	<5.0	ug/L	NC (3)	20
A803753	Dissolved Titanium (Ti)	2022/11/21	99 (2)	80 - 120	97	80 - 120	<5.0	ug/L	NC (3)	20
A803753	Dissolved Uranium (U)	2022/11/21	101 (2)	80 - 120	100	80 - 120	<0.10	ug/L	NC (3)	20
A803753	Dissolved Vanadium (V)	2022/11/21	100 (2)	80 - 120	100	80 - 120	<5.0	ug/L	NC (3)	20
A803753	Dissolved Zinc (Zn)	2022/11/21	99 (2)	80 - 120	103	80 - 120	<5.0	ug/L	NC (3)	20

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Bureau Veritas Job #: C291539

Report Date: 2022/12/23

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A803753	Dissolved Zirconium (Zr)	2022/11/21	104 (2)	80 - 120	100	80 - 120	<0.10	ug/L	NC (3)	20
A804591	1-Methylnaphthalene	2022/11/22	89	50 - 140	90	50 - 140	<0.050	ug/L	2.9 (1)	40
A804591	2-Methylnaphthalene	2022/11/22	93	50 - 140	94	50 - 140	<0.10	ug/L	NC (1)	40
A804591	Acenaphthene	2022/11/22	94	50 - 140	96	50 - 140	<0.050	ug/L	3.4 (1)	40
A804591	Acenaphthylene	2022/11/22	92	50 - 140	94	50 - 140	<0.050	ug/L	NC (1)	40
A804591	Acridine	2022/11/22	104	50 - 140	104	50 - 140	<0.050	ug/L	NC (1)	40
A804591	Anthracene	2022/11/22	85	50 - 140	90	50 - 140	<0.010	ug/L	1.4 (1)	40
A804591	Benzo(a)anthracene	2022/11/22	92	50 - 140	95	50 - 140	<0.010	ug/L	3.2 (1)	40
A804591	Benzo(a)pyrene	2022/11/22	92	50 - 140	110	50 - 140	<0.0050	ug/L	3.2 (1)	40
A804591	Benzo(b&j)fluoranthene	2022/11/22	78	50 - 140	94	50 - 140	<0.030	ug/L	NC (1)	40
A804591	Benzo(g,h,i)perylene	2022/11/22	60	50 - 140	92	50 - 140	<0.050	ug/L	NC (1)	40
A804591	Benzo(k)fluoranthene	2022/11/22	89	50 - 140	100	50 - 140	<0.050	ug/L	NC (1)	40
A804591	Chrysene	2022/11/22	86	50 - 140	91	50 - 140	<0.020	ug/L	3.2 (1)	40
A804591	Dibenz(a,h)anthracene	2022/11/22	63	50 - 140	98	50 - 140	<0.0030	ug/L	6.5 (1)	40
A804591	Fluoranthene	2022/11/22	80	50 - 140	82	50 - 140	<0.020	ug/L	1.6 (1)	40
A804591	Fluorene	2022/11/22	97	50 - 140	96	50 - 140	<0.050	ug/L	3.0 (1)	40
A804591	Indeno(1,2,3-cd)pyrene	2022/11/22	62	50 - 140	95	50 - 140	<0.050	ug/L	NC (1)	40
A804591	Naphthalene	2022/11/22	85	50 - 140	86	50 - 140	<0.10	ug/L	NC (1)	40
A804591	Phenanthrene	2022/11/22	95	50 - 140	97	50 - 140	<0.050	ug/L	3.0 (1)	40
A804591	Pyrene	2022/11/22	79	50 - 140	78	50 - 140	<0.020	ug/L	1.7 (1)	40
A804591	Quinoline	2022/11/22	105	50 - 140	103	50 - 140	<0.020	ug/L	NC (1)	40
A804600	EPH (C10-C19)	2022/11/21	97	60 - 140	96	70 - 130	<0.20	mg/L	NC (1)	30
A804600	EPH (C19-C32)	2022/11/21	117	60 - 140	114	70 - 130	<0.20	mg/L	NC (1)	30
A804708	Total Ammonia (N)	2022/11/21	NC	80 - 120	100	80 - 120	<0.015	mg/L	0.082 (1)	20
A804709	Total Ammonia (N)	2022/11/21	96	80 - 120	101	80 - 120	<0.015	mg/L	NC (1)	20
A805382	Chloride (Cl)	2022/11/21	109	80 - 120	102	80 - 120	<1.0	mg/L	13 (1)	20
A805382	Sulphate (SO4)	2022/11/21	101	80 - 120	96	80 - 120	<1.0	mg/L	NC (1)	20
A806249	Orthophosphate (P)	2022/11/22	93	80 - 120	108	80 - 120	<0.0030	mg/L	NC (1)	20
A806292	Nitrate plus Nitrite (N)	2022/11/22	110	80 - 120	107	80 - 120	<0.020	mg/L	NC (1)	25
A806294	Nitrite (N)	2022/11/22	106	80 - 120	101	80 - 120	<0.0050	mg/L	NC (1)	20
A806297	Nitrate plus Nitrite (N)	2022/11/22	106 (4)	80 - 120	109	80 - 120	<0.020	mg/L	0.016 (5)	25



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Bureau Veritas Job #: C291539

Report Date: 2022/12/23

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A806299	Nitrite (N)	2022/11/22	106 (4)	80 - 120	102	80 - 120	<0.0050	mg/L	NC (5)	20
A806440	Total Dissolved Solids	2022/11/24	104	80 - 120	99	80 - 120	<10	mg/L	4.3 (6)	20
A806613	Alkalinity (PP as CaCO ₃)	2022/11/21					<1.0	mg/L	NC (1)	20
A806613	Alkalinity (Total as CaCO ₃)	2022/11/21	NC	80 - 120	95	80 - 120	<1.0	mg/L	0.32 (1)	20
A806613	Bicarbonate (HCO ₃)	2022/11/21					<1.0	mg/L	0.32 (1)	20
A806613	Carbonate (CO ₃)	2022/11/21					<1.0	mg/L	NC (1)	20
A806613	Hydroxide (OH)	2022/11/21					<1.0	mg/L	NC (1)	20
A806616	Conductivity	2022/11/21			102	80 - 120	<2.0	uS/cm	0.27 (1)	10
A806738	Alkalinity (PP as CaCO ₃)	2022/11/22					<1.0	mg/L	NC (8)	20
A806738	Alkalinity (Total as CaCO ₃)	2022/11/22	107 (7)	80 - 120	95	80 - 120	<1.0	mg/L	1.4 (8)	20
A806738	Bicarbonate (HCO ₃)	2022/11/22					<1.0	mg/L	1.4 (8)	20
A806738	Carbonate (CO ₃)	2022/11/22					<1.0	mg/L	NC (8)	20
A806738	Hydroxide (OH)	2022/11/22					<1.0	mg/L	NC (8)	20
A807412	Total Sulphide	2022/11/23	NC	80 - 120	110	80 - 120	<0.0018	mg/L	17 (1)	20
A807429	Total Dissolved Solids	2022/11/25	104	80 - 120	101	80 - 120	<10	mg/L	0.88 (1)	20
A809432	Dissolved Mercury (Hg)	2022/11/25	102	80 - 120	94	80 - 120	<0.0019	ug/L	NC (1)	20



**BUREAU
VERITAS**

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A823696	Conductivity	2022/11/21			102	80 - 120	<2.0	uS/cm	0.25 (9)	10

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [BHI289-04]

(3) Duplicate Parent ID [BHI289-04]

(4) Matrix Spike Parent ID [BHI289-02]

(5) Duplicate Parent ID [BHI289-02]

(6) Duplicate Parent ID [BHI280-02]

(7) Matrix Spike Parent ID [BHI288-02]

(8) Duplicate Parent ID [BHI288-02]

(9) Duplicate Parent ID [BHI288-07]



BUREAU
VERITAS

Bureau Veritas Job #: C291539

Report Date: 2022/12/23

GHD Limited

Client Project #: 11222680 - ORIGINAL LANDFILL

Site Location: ORIGINAL LANDFILL

Your P.O. #: 735-004088

Sampler Initials: CXW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager



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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



Bureau Veritas
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Page 1 of 2



C291539_COC

INVOICE TO:		Report Information		Project Information	
Company Name	#163 GHD Limited	Company Name	Airesse MacPhee	Quotation #	C20003
Contact Name	AP Invoices - 735	Contact Name	Airesse MacPhee	P.O. #	735-004088
Address	455 PHILIP STREET	Address		Project #	11222680-13.1
	WATERLOO ON N2L 3X2			Project Name	Upland Landfill
Phone	(519) 884-0510	Phone		Site #	Groundwater
Email	APinvoices-735@ghd.com	Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Sampled By	CXN, MR

Regulatory Criteria:		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)												Turnaround Time (TAT) Required:	
☒ CBR				Metals Field Filtered? (Y/N)	Conductivity, Cl, SO4, NO2, NO3, N-N, PO4	Speciated Alkalinity	Sulphide + H2S Calc	Sulphide, Un-ionized (as H2S) (Calc)	Ammonia-N (Total)	Dissolved Metals with CV Hg Hardness	Total Dissolved Solids (Filt. Residue)	LEP/MHEPH with ~~unfiltered~~ PAHs	Field pH	Field Temperature	Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dissolved Oxygen are + 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission): 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐ Rush Confirmation Number: ☐ (fill in for #)		
☐ CCME															Please provide advance notice for rush projects.		
☐ BC Water Quality																	
☐ Other																	

Sample Barcode Label		Sample (Location) Identification		Date Sampled	Time Sampled	Matrix	Metals	Conductivity	Speciation	Substrate	Ammonia	Dissolved	Total	LEP	Field	Field	# of Batches	Comments
1		W4-1122680-161122-CXW-01		Nov 16, 22	10:37	WATER	Y	X	X	X	X	X	X	X	7.32	13.05	7	
2			-02		11:30										7.55	11.84		
3			-03		11:32										7.55	11.84		
4			-04		12:20										7.61	9.70		
5			-05		13:45										7.47	10.90		
6			-06		13:55										7.86	11.06		
7			-07		14:55										7.19	9.68		
8			-08		15:47										~~7.19~~ 10.78			pH: 7.73
9		W4-1122680-171122-CXW-09		Nov 17, 22	08:25										6.36	14.02		
10			-10		08:40										6.73	8.87		

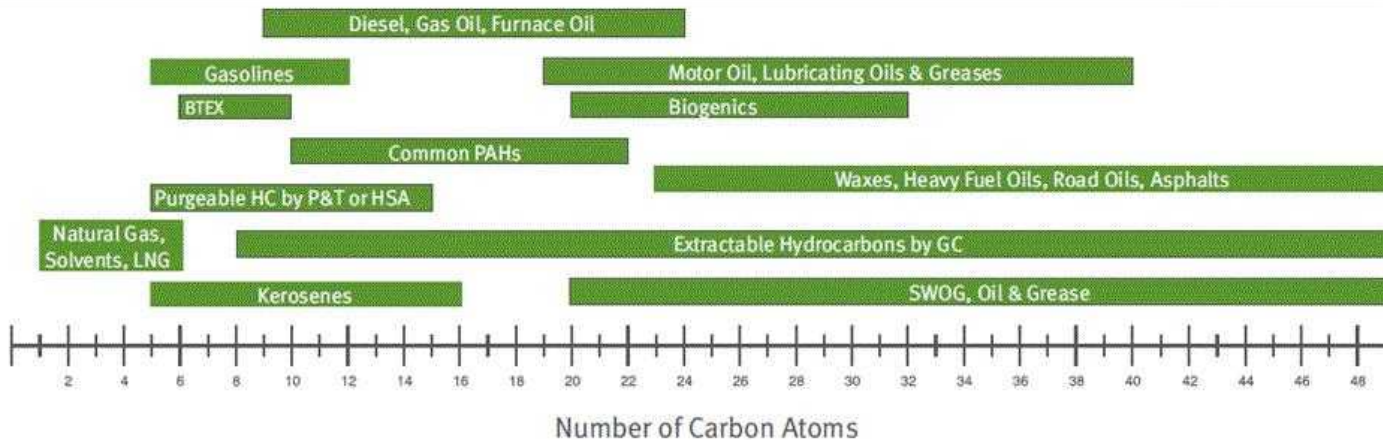
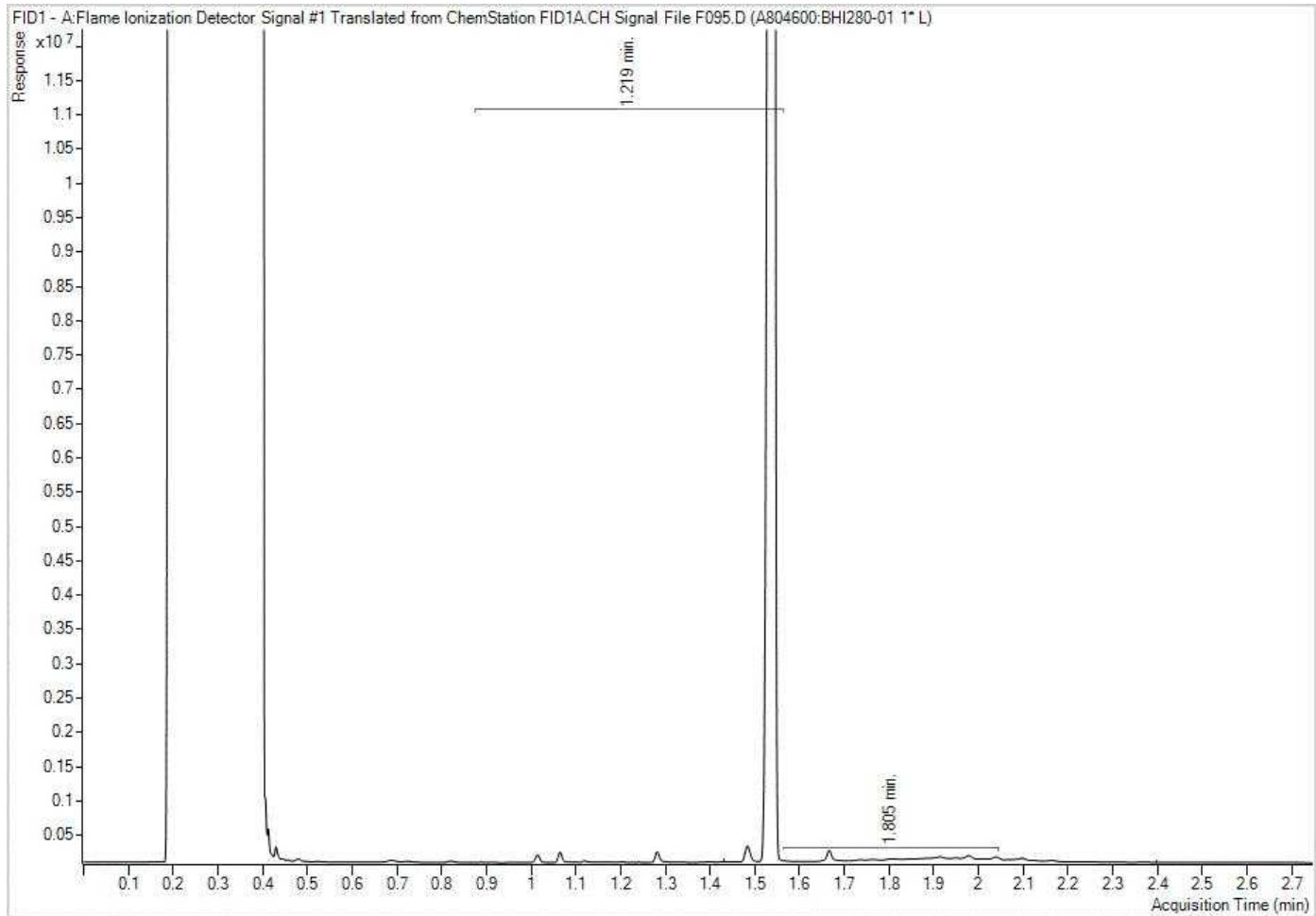
RELINQUISHED BY: (Signature/Print)		Date: (YYMMDD)	Time	RECEIVED BY: (Signature/Print)		Date: (YYMMDD)	Time	# jars used and not submitted	Time (h:m:s)	Temp (°C) on Receipt	Custody Seal intact on Cooler?
CARM WONG		22/11/18	18:40	A. FLORES LLO		2022/11/19	09:00			9/10/10	☐ Yes ☒ No

UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNED THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL/RESOURCES/RESOURCES/COC-TERMS-AND-CONDITIONS.

IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

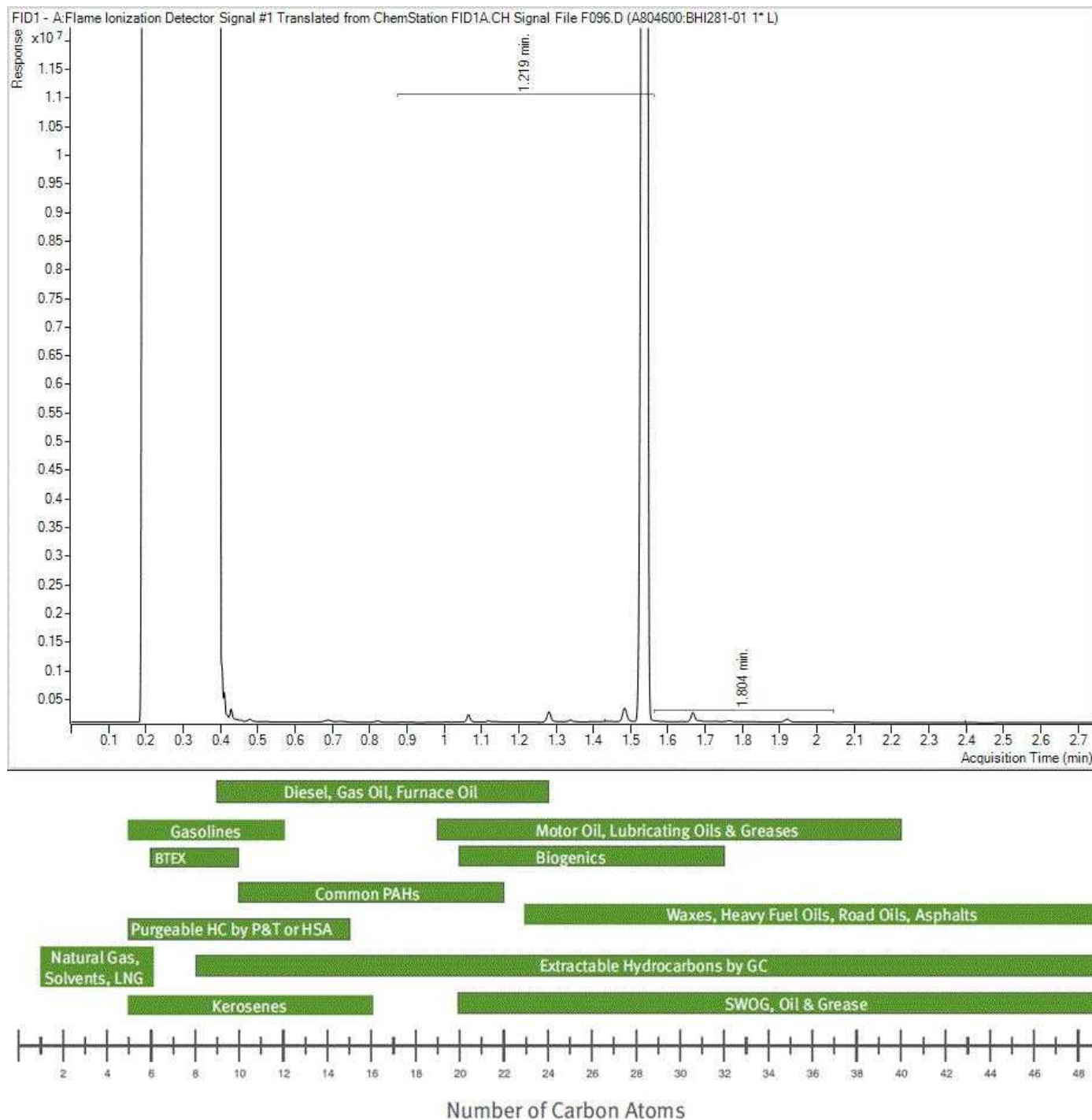
1 Ce: 40

EPH in Water when PAH required Chromatogram



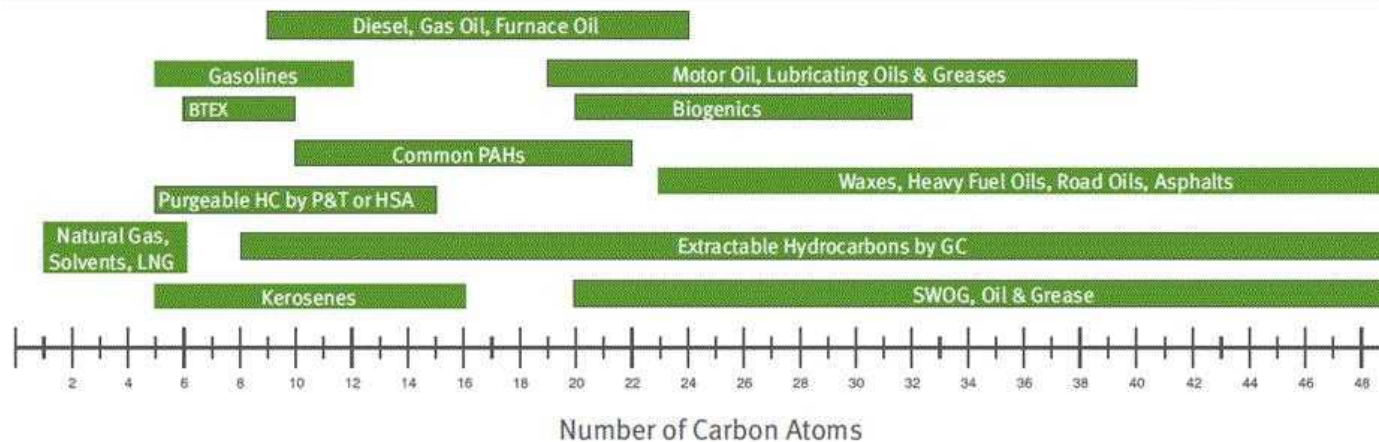
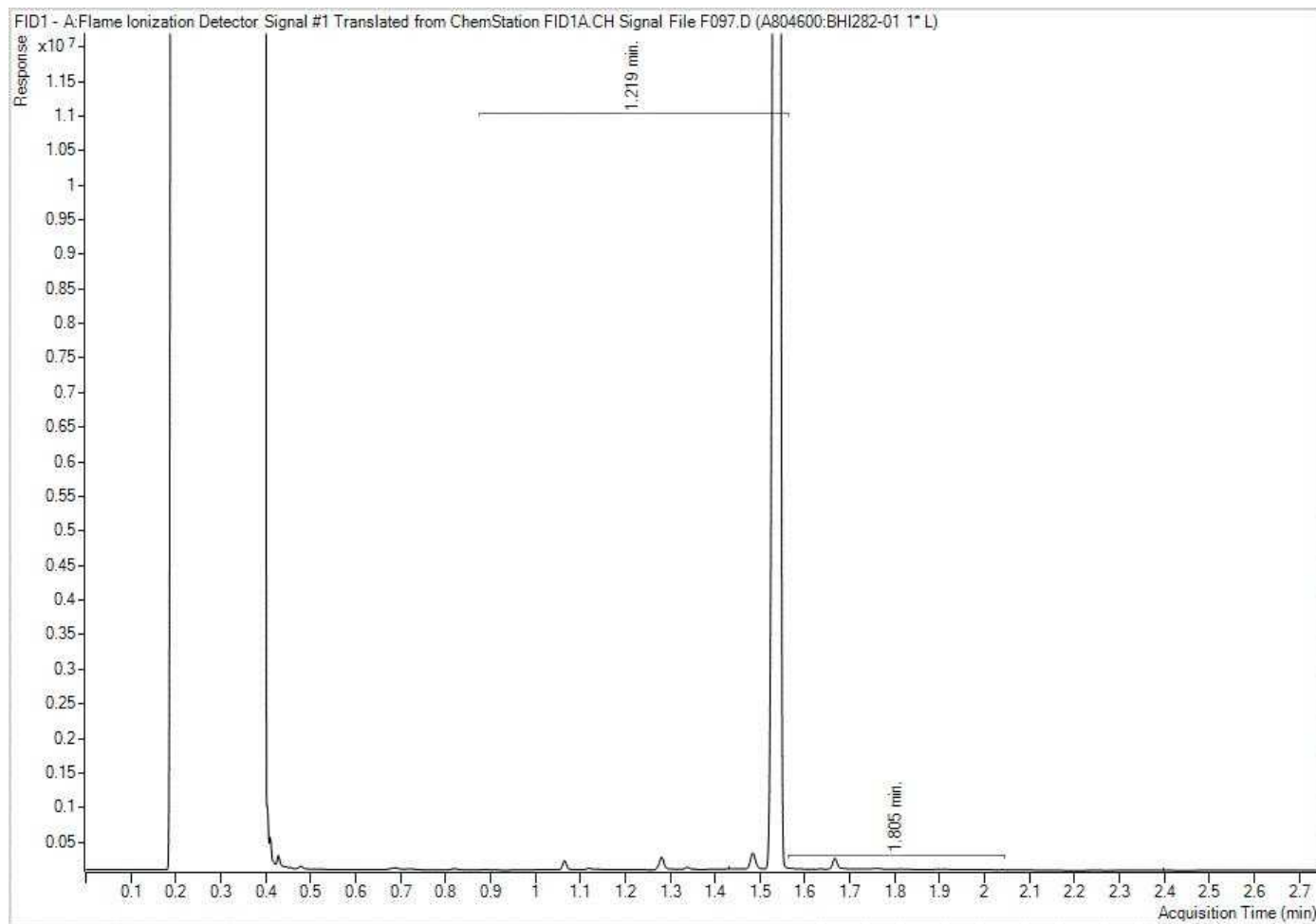
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



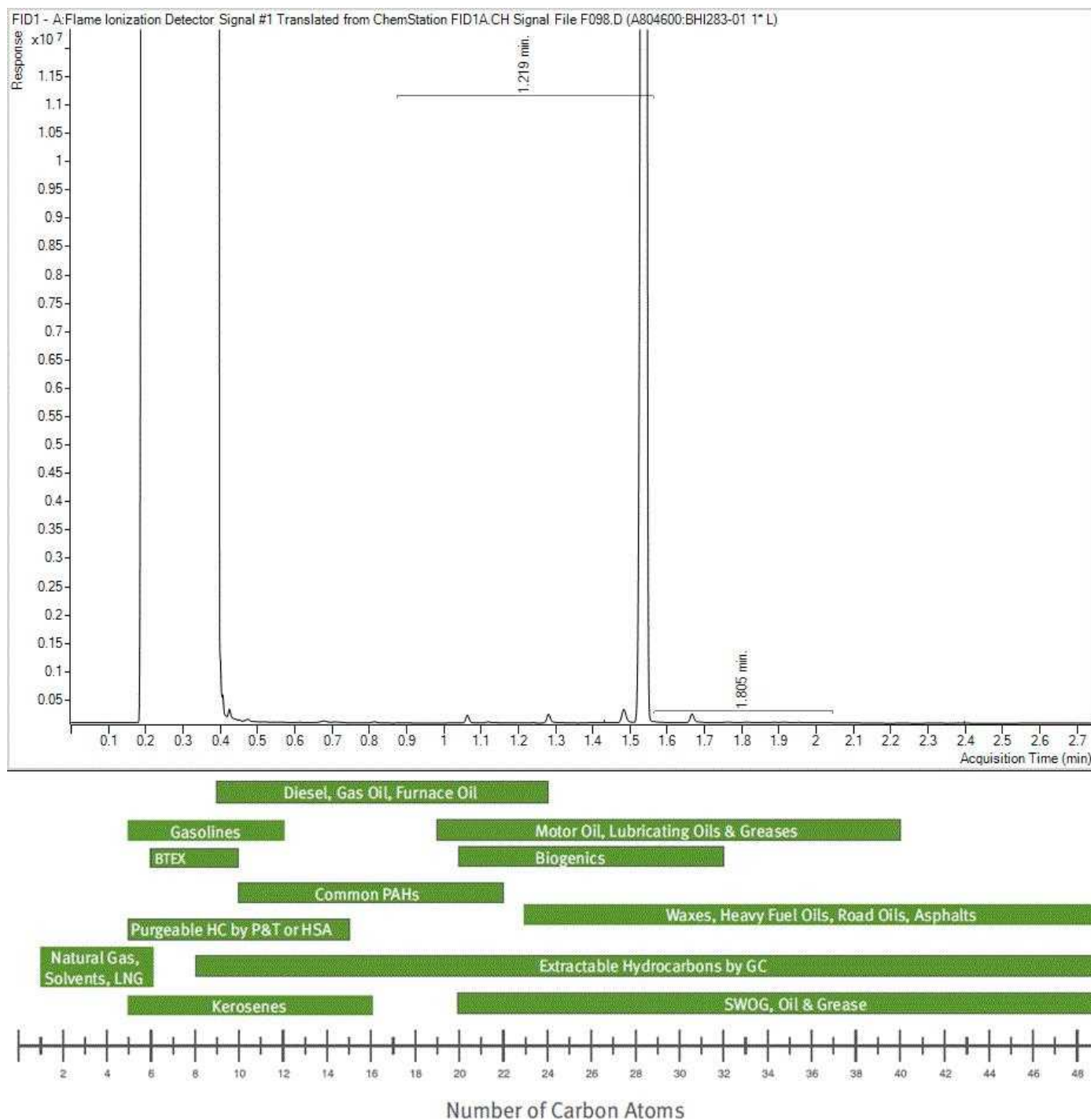
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



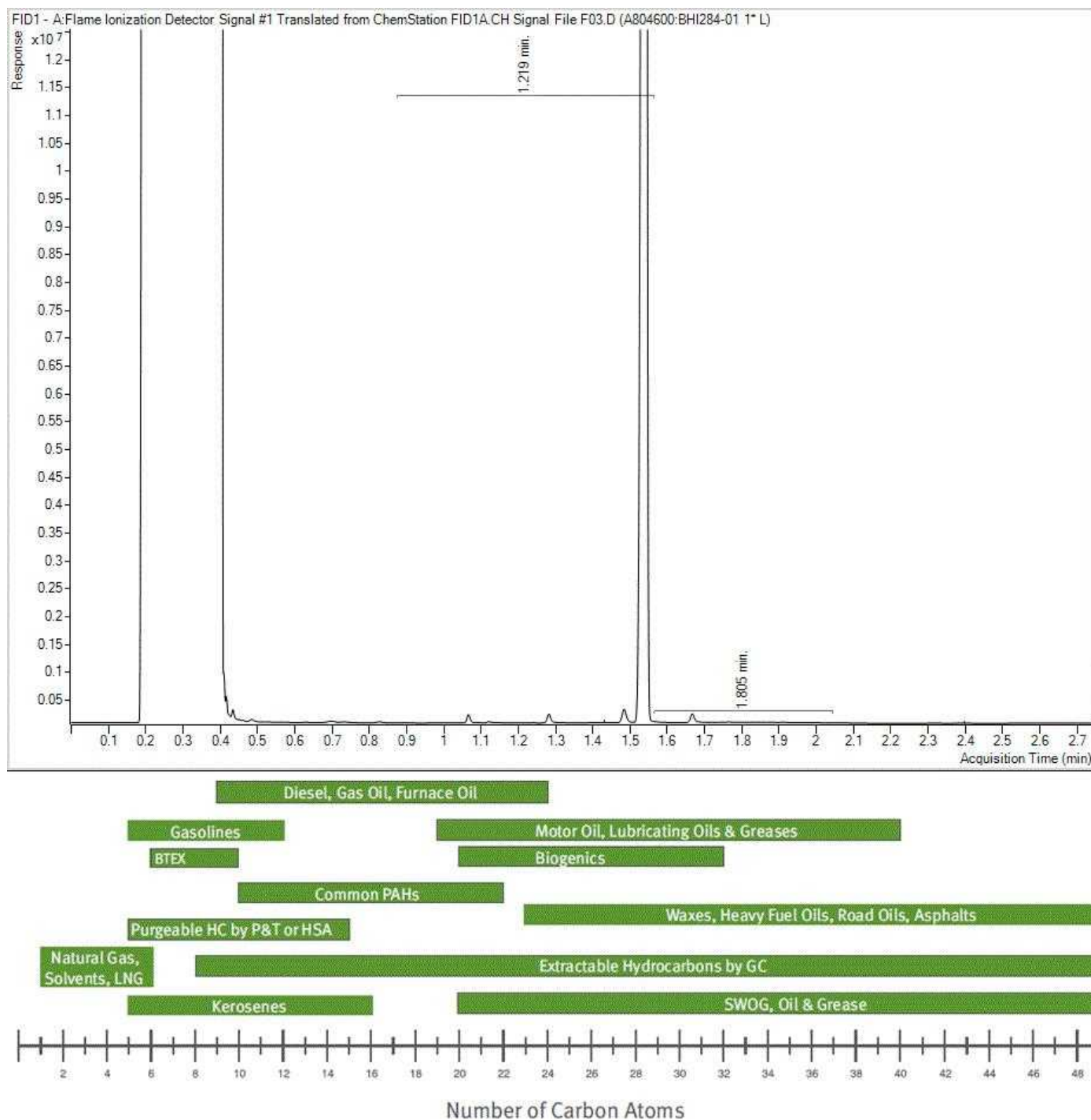
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



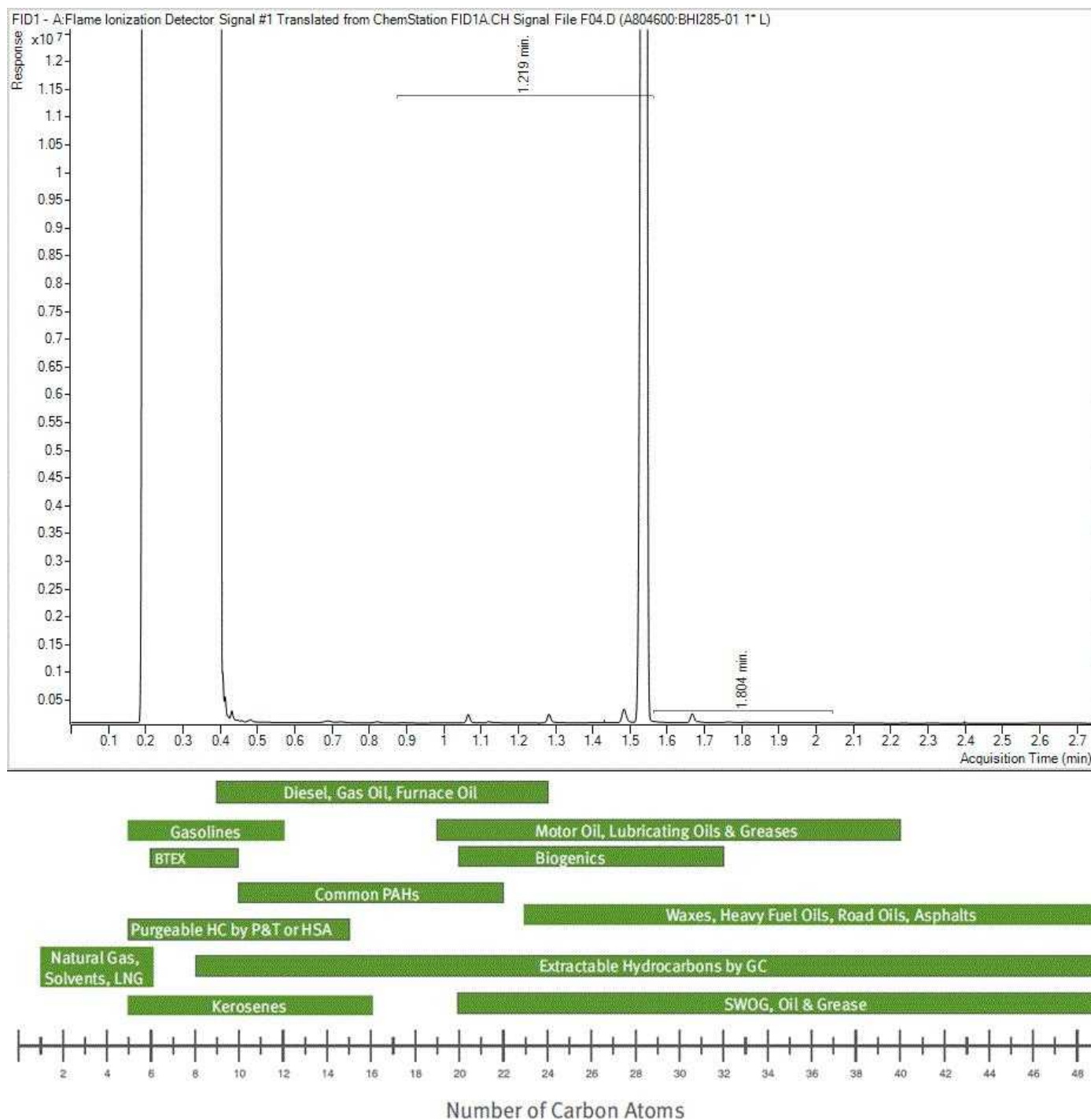
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



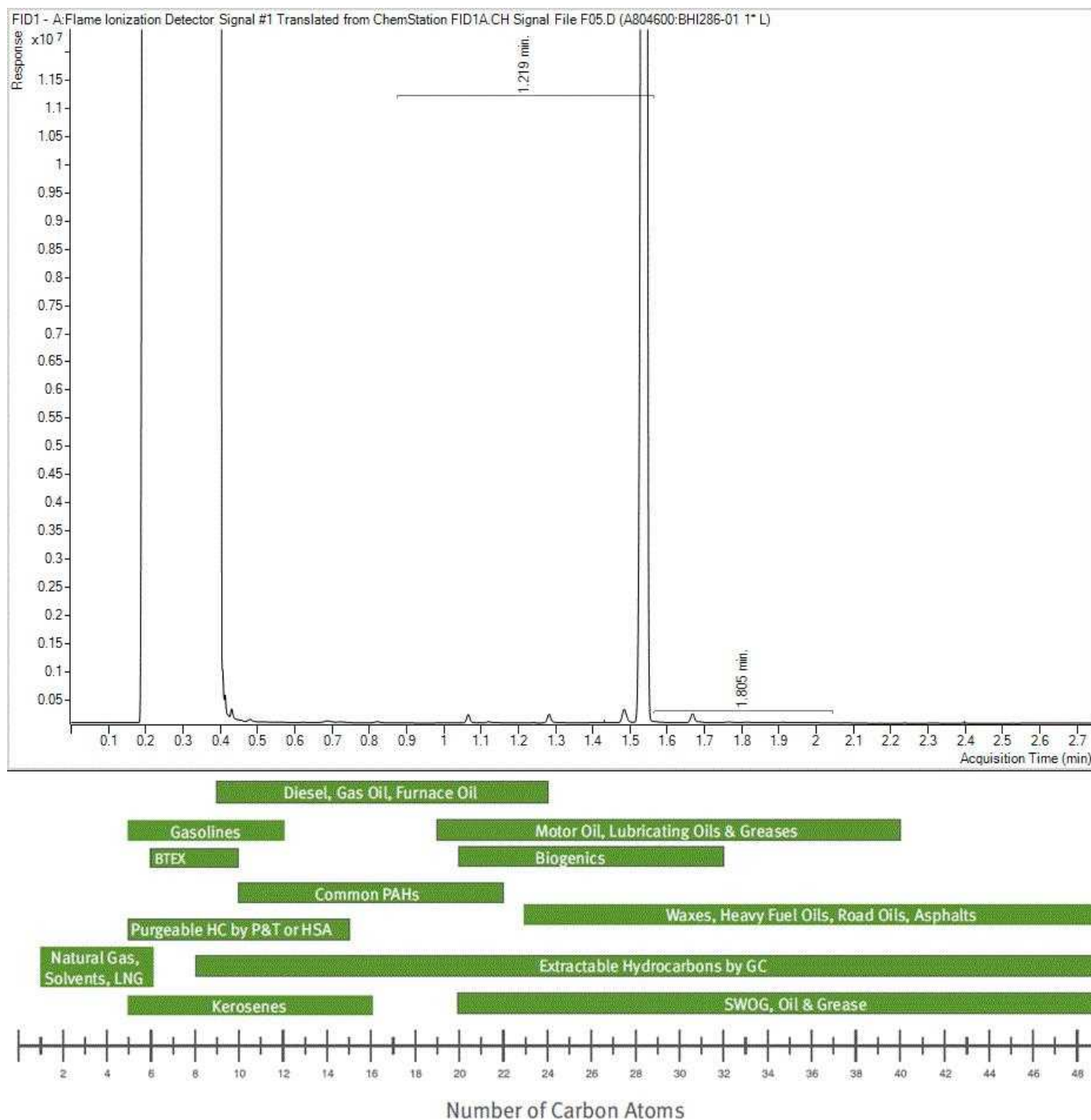
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



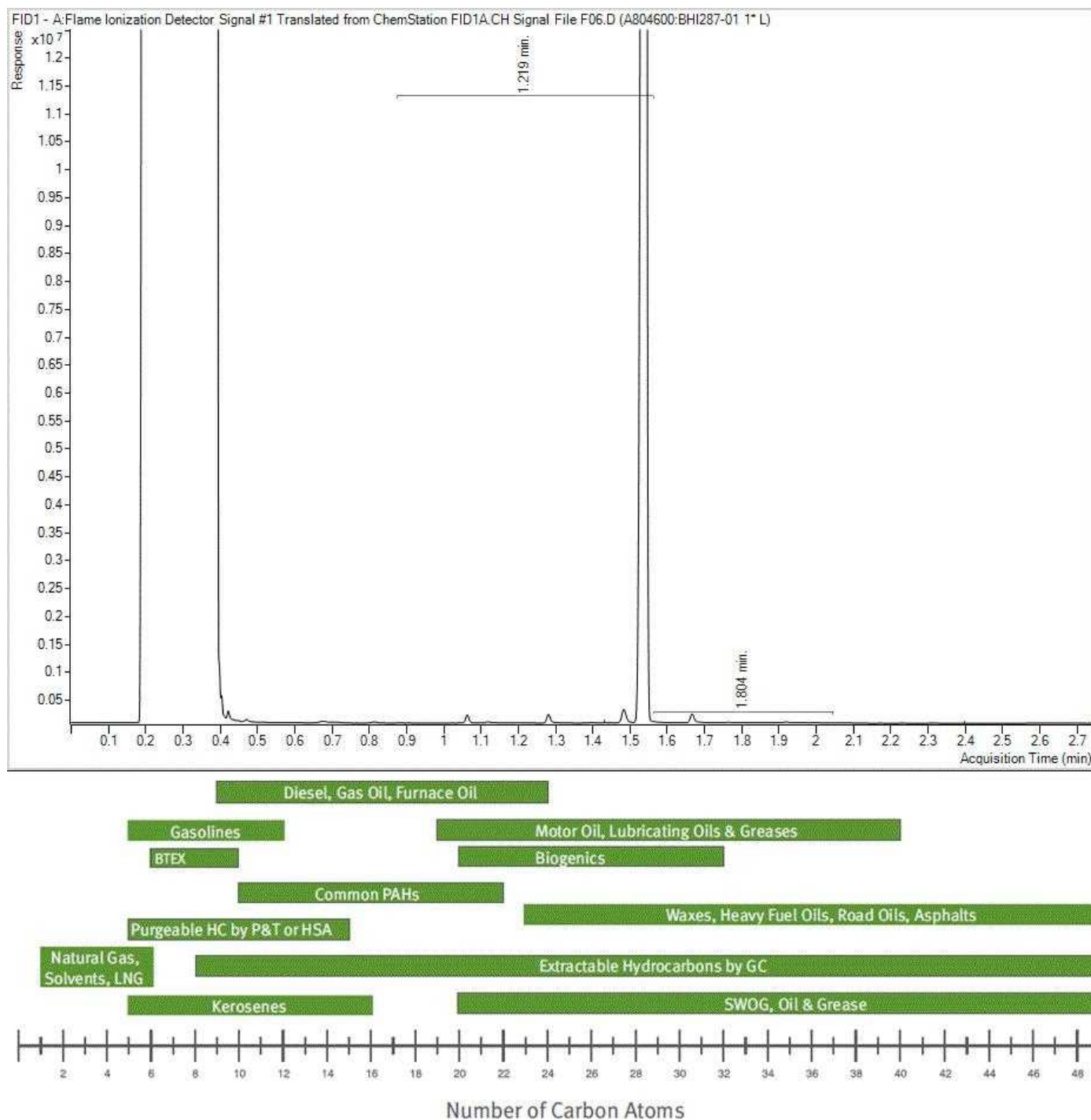
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



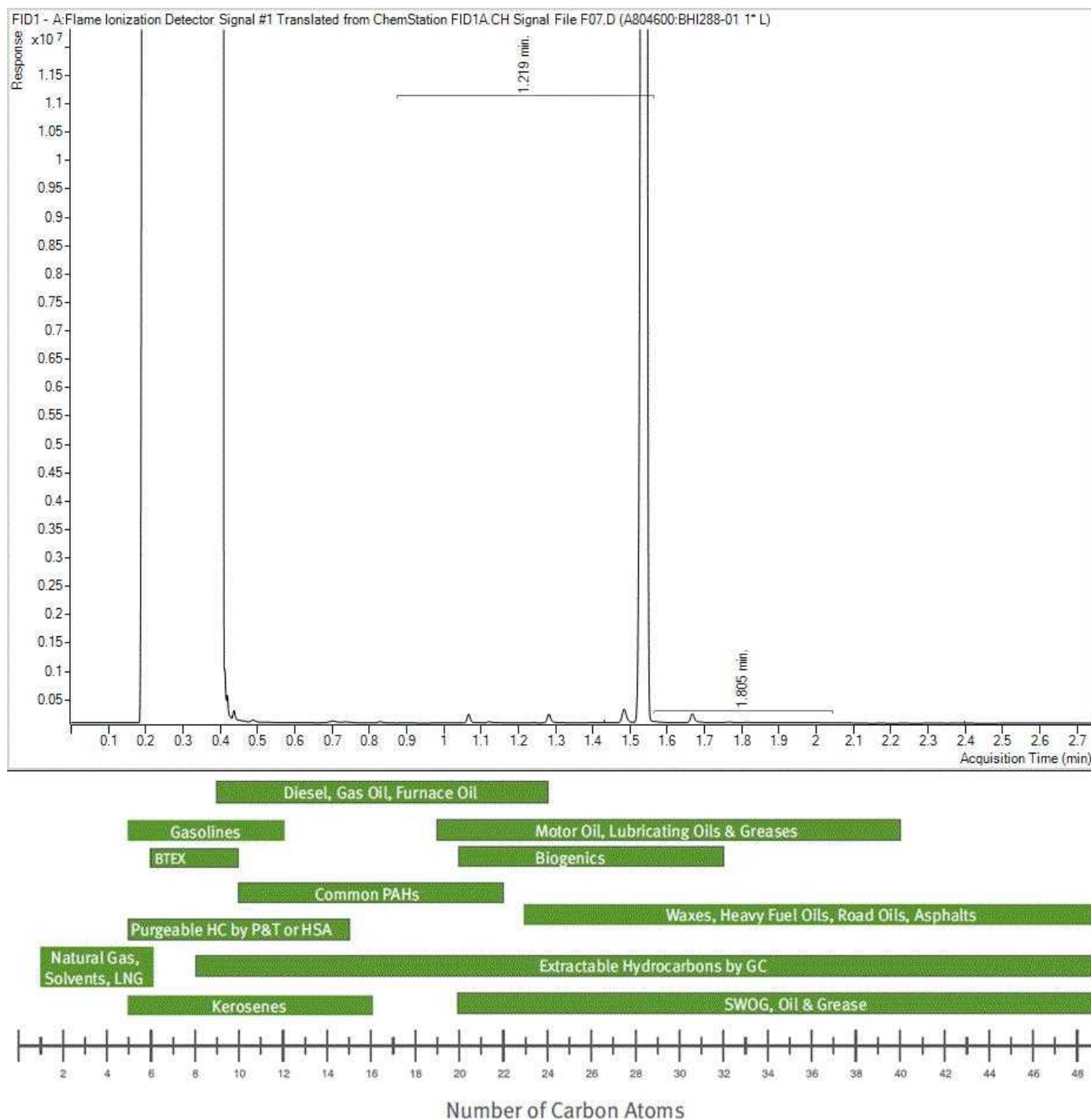
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



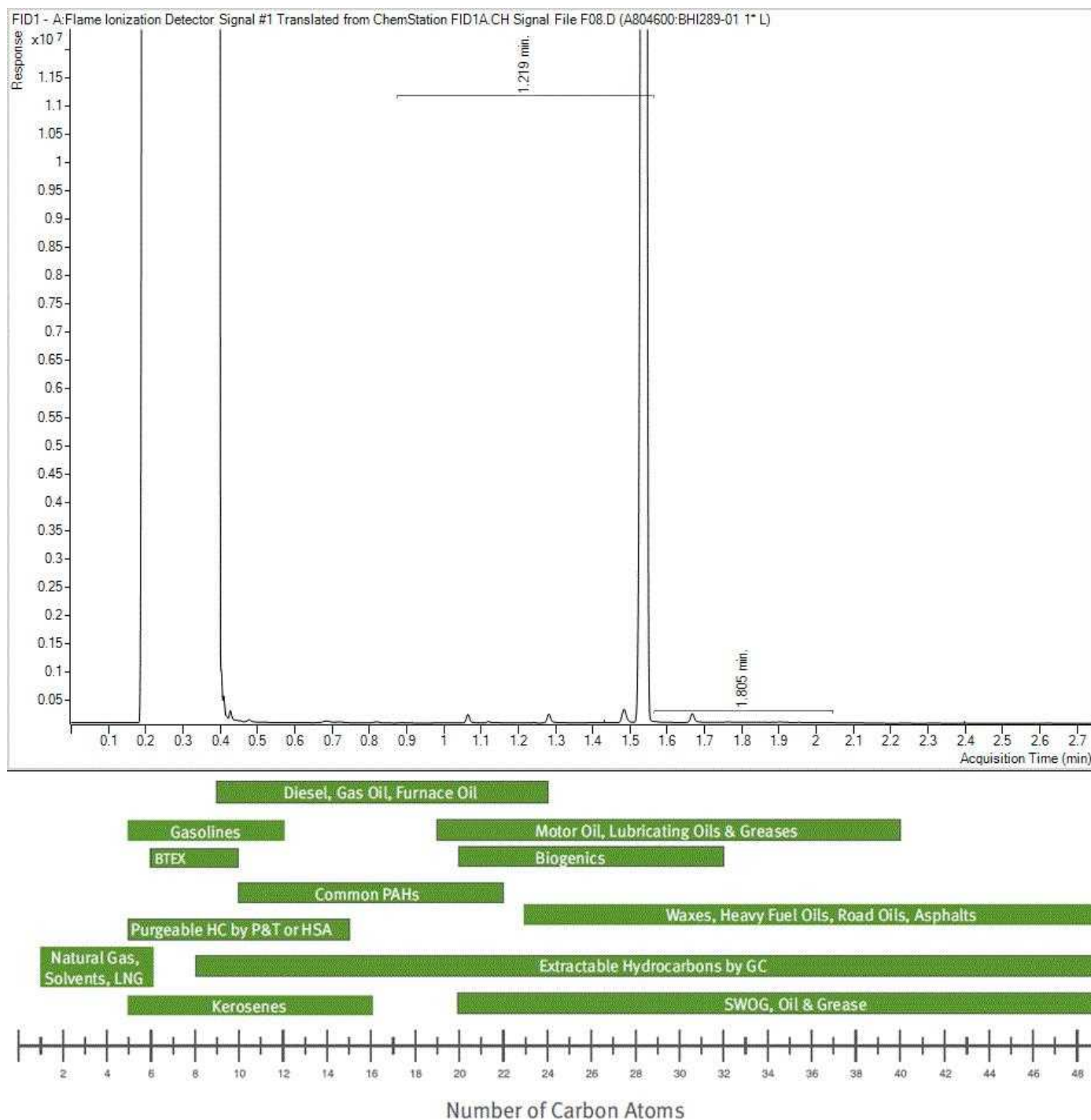
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Appendix D

Data Validation and Assessment Memorandum

Technical Memorandum

February 28, 2023

Revised February 28, 2023

To	Rose Marie Rocca, Kathleen Hasler, Melissa Jenkins, David R Barton, Carny Wong	Tel	+1 519 340-3926
Copy to		Email	Stephanie.Berton@ghd.com
From	Airesse MacPhee/Stephanie Berton/an/02	Ref. No.	11222680
Subject	Data Quality Assessment and Verification		

Laboratory:	Bureau Veritas Laboratories				
Lab Job No.:	C221453, C244102, C244592, C244598, C244597, C268908, C268889, C291536, C291540, C291539				
Date(s) Sampled:	April – November, 2022				
Media Sampled:	Groundwater, Surface Water, and Leachate Water				
QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☐	☒	☒	☐
Temperature	<10°C at receipt	☒	☐	☐	☐
Sample Preservation	Required container/preservatives	☐	☒	☐	☐
Field Duplicate (blind)	Water: Within 20% of original/<1xRL	☐	☒	☐	☐
Field Blank (blind)	Non detect	☐	☒	☐	☐
Trip Blank	Non detect	☐	☐	☐	☒
Lab QA/QC	Within standard recoveries	☐	☒	☐	☐

The following results are qualified or rejected due to holding time exceedances:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C244597	06/23/2022	WS-11222680-230622-CXW-01	Total suspended solids (TSS)	2.1	R	mg/L
C244597	06/23/2022	WS-11222680-230622-CXW-02	Total suspended solids (TSS)	2.5	J	mg/L
C291536	11/17/2022	WS-11222680-171122-CXW-01	Nitrate (as N)	0.020	UJ	mg/L
C291536	11/17/2022	WS-11222680-171122-CXW-02	Nitrate (as N)	0.020	UJ	mg/L
C291536	11/17/2022	WS-11222680-171122-CXW-01	Nitrite (as N)	0.0050	UJ	mg/L
C291536	11/17/2022	WS-11222680-171122-CXW-02	Nitrite (as N)	0.0050	UJ	mg/L
C291536	11/17/2022	WS-11222680-171122-CXW-01	Nitrite/Nitrate	0.020	UJ	mg/L

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C291536	11/17/2022	WS-11222680-171122-CXW-02	Nitrite/Nitrate	0.020	UJ	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-01	Nitrate (as N)	0.781	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-02	Nitrate (as N)	0.267	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-03	Nitrate (as N)	0.266	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-04	Nitrate (as N)	0.612	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-05	Nitrate (as N)	0.322	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-06	Nitrate (as N)	0.055	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-07	Nitrate (as N)	0.784	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-08	Nitrate (as N)	0.323	J	mg/L
C291539	11/17/2022	WG-11222680-171122-CXW-09	Nitrate (as N)	0.063	J	mg/L
C291539	11/17/2022	WG-11222680-171122-CXW-10	Nitrate (as N)	0.616	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-01	Nitrite (as N)	0.0050	UJ	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-02	Nitrite (as N)	0.0107	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-03	Nitrite (as N)	0.0114	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-04	Nitrite (as N)	0.0050	UJ	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-05	Nitrite (as N)	0.0050	UJ	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-06	Nitrite (as N)	0.0050	UJ	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-07	Nitrite (as N)	0.0050	UJ	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-08	Nitrite (as N)	0.0050	UJ	mg/L
C291539	11/17/2022	WG-11222680-171122-CXW-09	Nitrite (as N)	0.0050	UJ	mg/L
C291539	11/17/2022	WG-11222680-171122-CXW-10	Nitrite (as N)	0.0050	UJ	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-01	Nitrite/Nitrate	0.781	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-02	Nitrite/Nitrate	0.278	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-03	Nitrite/Nitrate	0.278	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-04	Nitrite/Nitrate	0.612	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-05	Nitrite/Nitrate	0.322	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-06	Nitrite/Nitrate	0.055	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-07	Nitrite/Nitrate	0.784	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-08	Nitrite/Nitrate	0.323	J	mg/L
C291539	11/17/2022	WG-11222680-171122-CXW-09	Nitrite/Nitrate	0.063	J	mg/L
C291539	11/17/2022	WG-11222680-171122-CXW-10	Nitrite/Nitrate	0.616	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-01	Orthophosphate	0.0084	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-02	Orthophosphate	0.0071	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-03	Orthophosphate	0.0067	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-04	Orthophosphate	0.0065	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-05	Orthophosphate	0.0037	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-06	Orthophosphate	0.027	J	mg/L

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C291539	11/16/2022	WG-11222680-161122-CXW-07	Orthophosphate	0.0055	J	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-08	Orthophosphate	0.0034	J	mg/L
C291539	11/17/2022	WG-11222680-171122-CXW-09	Orthophosphate	0.0045	J	mg/L
C291539	11/17/2022	WG-11222680-171122-CXW-10	Orthophosphate	0.0055	J	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-01	Nitrate (as N)	0.20	UJ	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-02	Nitrate (as N)	0.020	UJ	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-01	Nitrite (as N)	0.050	UJ	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-02	Nitrite (as N)	0.0050	UJ	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-01	Nitrite/Nitrate	0.20	UJ	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-02	Nitrite/Nitrate	0.020	UJ	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-01	Orthophosphate	0.0030	UJ	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-02	Orthophosphate	0.0030	UJ	mg/L

The following results are qualified due to a laboratory mistake which resulted in the addition of sulfuric acid instead of NaOH and zinc acetate during sample preparation. This was recognized immediately and the correct chemicals were added. Spiking a sample impacted by this still resulted in recovery within acceptance limits. However, there is still a possibility that results could be biased low due to this mistake:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C244598	06/22/2022	WG-11222680-220622-CXW-01	Hydrogen sulfide	0.0050	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-01	Hydrogen sulfide	0.0030	J-	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-06	Hydrogen sulfide	0.0050	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-06	Hydrogen sulfide	0.0020	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-07	Hydrogen sulfide	0.0050	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-07	Hydrogen sulfide	0.0020	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-08	Hydrogen sulfide	0.0050	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-08	Hydrogen sulfide	0.0020	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-09	Hydrogen sulfide	0.0050	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-09	Hydrogen sulfide	0.0020	UJ	mg/L
C244598	06/23/2022	WG-11222680-230622-CXW-11	Hydrogen sulfide	0.0050	UJ	mg/L
C244598	06/23/2022	WG-11222680-230622-CXW-11	Hydrogen sulfide	0.0020	UJ	mg/L
C244598	06/23/2022	WG-11222680-230622-CXW-12	Hydrogen sulfide	0.0020	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-01	Hydrogen sulfide (unionized)	0.0050	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-06	Hydrogen sulfide (unionized)	0.0050	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-07	Hydrogen sulfide (unionized)	0.0050	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-08	Hydrogen sulfide (unionized)	0.0050	UJ	mg/L

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C244598	06/22/2022	WG-11222680-220622-CXW-09	Hydrogen sulfide (unionized)	0.0050	UJ	mg/L
C244598	06/23/2022	WG-11222680-230622-CXW-11	Hydrogen sulfide (unionized)	0.0050	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-01	Sulfide	0.0028	J-	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-06	Sulfide	0.0018	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-07	Sulfide	0.0018	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-08	Sulfide	0.0018	UJ	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-09	Sulfide	0.0018	UJ	mg/L
C244598	06/23/2022	WG-11222680-230622-CXW-11	Sulfide	0.0018	UJ	mg/L
C244598	06/23/2022	WG-11222680-230622-CXW-12	Sulfide	0.0018	UJ	mg/L

The following results are qualified due to incomplete preservation (Sample pH <9). Due to volatility of analyte, a low bias in the results is likely:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C244592	06/23/2022	WL-11222680-230622-CXW-02	Hydrogen sulfide	0.0050	UJ	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-02	Hydrogen sulfide	0.0020	UJ	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-04	Hydrogen sulfide	12	J-	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-04	Hydrogen sulfide	22	J-	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-02	Hydrogen sulfide (unionized)	0.0050	UJ	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-04	Hydrogen sulfide (unionized)	13	J-	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-02	Sulfide	0.0018	UJ	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-04	Sulfide	21	J-	mg/L
C221453	04/01/2022	WS-11222680-010422-MJ-01	Calcium (dissolved)	4.29	J	mg/L
C221453	04/01/2022	WS-11222680-010422-MJ-02	Calcium (dissolved)	7.17	J	mg/L
C221453	04/01/2022	WL-11222680-010422-MJ-01	Calcium (dissolved)	774	J	mg/L
C221453	04/01/2022	WL-11222680-010422-MJ-02	Calcium (dissolved)	814	J	mg/L
C221453	04/01/2022	WS-11222680-010422-MJ-01	Magnesium (dissolved)	1.07	J	mg/L
C221453	04/01/2022	WS-11222680-010422-MJ-02	Magnesium (dissolved)	0.771	J	mg/L
C221453	04/01/2022	WL-11222680-010422-MJ-01	Magnesium (dissolved)	47.0	J	mg/L
C221453	04/01/2022	WL-11222680-010422-MJ-02	Magnesium (dissolved)	46.5	J	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-03	Hydrogen sulfide	0.11	J-	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-03	Hydrogen sulfide	0.14	J-	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-05	Hydrogen sulfide	0.086	J-	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-05	Hydrogen sulfide	0.011	J-	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-03	Hydrogen sulfide (unionized)	0.12	J-	mg/L

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C244592	06/23/2022	WL-11222680-230622-CXW-05	Hydrogen sulfide (unionized)	0.012	J-	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-03	Sulfide	0.14	J-	mg/L
C244592	06/23/2022	WL-11222680-230622-CXW-05	Sulfide	0.081	J-	mg/L
C268889	09/08/2022	WL-11222680-080922-CXW-02	Hydrogen sulfide	12	J-	mg/L
C268889	09/08/2022	WL-11222680-080922-CXW-02	Hydrogen sulfide	4.1	J-	mg/L
C268889	09/08/2022	WL-11222680-080922-CXW-03	Hydrogen sulfide	4.3	J-	mg/L
C268889	09/08/2022	WL-11222680-080922-CXW-03	Hydrogen sulfide	12	J-	mg/L
C268889	09/08/2022	WL-11222680-080922-CXW-02	Hydrogen sulfide (unionized)	4.4	J-	mg/L
C268889	09/08/2022	WL-11222680-080922-CXW-03	Hydrogen sulfide (unionized)	4.5	J-	mg/L
C268889	09/08/2022	WL-11222680-080922-CXW-02	Sulfide	11	J-	mg/L
C268889	09/08/2022	WL-11222680-080922-CXW-03	Sulfide	12	J-	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-07	Hydrogen sulfide	0.0050	UJ	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-07	Hydrogen sulfide	0.0019	UJ	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-07	Hydrogen sulfide (unionized)	0.0050	UJ	mg/L
C291539	11/16/2022	WG-11222680-161122-CXW-07	Sulfide	0.0018	UJ	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-01	Hydrogen sulfide	1.4	J-	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-01	Hydrogen sulfide	1.2	J-	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-02	Hydrogen sulfide	0.30	J-	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-02	Hydrogen sulfide	0.19	J-	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-01	Hydrogen sulfide (unionized)	1.3	J-	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-02	Hydrogen sulfide (unionized)	0.20	J-	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-01	Sulfide	1.3	J-	mg/L
C291540	11/17/2022	WL-11222680-171122-CXW-02	Sulfide	0.28	J-	mg/L

The following results are qualified due to field duplicate variability:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C221453	04/01/2022	WL-11222680-010422-MJ-01	Benzo(a)pyrene	0.017	J	ug/L
C221453	04/01/2022	WL-11222680-010422-MJ-02	Benzo(a)pyrene	0.0089	J	ug/L
C221453	04/01/2022	WL-11222680-010422-MJ-01	Hydrogen sulfide	7.4	J	mg/L
C221453	04/01/2022	WL-11222680-010422-MJ-01	Hydrogen sulfide	11	J	mg/L
C221453	04/01/2022	WL-11222680-010422-MJ-02	Hydrogen sulfide	10	J	mg/L
C221453	04/01/2022	WL-11222680-010422-MJ-02	Hydrogen sulfide	15	J	mg/L
C221453	04/01/2022	WL-11222680-010422-MJ-01	Hydrogen sulfide (unionized)	7.9	J	mg/L

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C221453	04/01/2022	WL-11222680-010422-MJ-02	Hydrogen sulfide (unionized)	11	J	mg/L
C221453	04/01/2022	WL-11222680-010422-MJ-01	Sulfide	10	J	mg/L
C221453	04/01/2022	WL-11222680-010422-MJ-02	Sulfide	14	J	mg/L

The following result are qualified due to requiring laboratory filtration and preservation:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C291540	11/17/2022	WL-11222680-171122-CXW-02	Mercury (dissolved)	0.0019	UJ	ug/L

The following results are qualified as mercury was analyzed using the HDPE container and nitric acid preservative, these non-conformances can cause stability and high or low biases:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C268889	09/08/2022	WL-11222680-080922-CXW-01	Mercury	0.019	UJ	ug/L
C268889	09/08/2022	WL-11222680-080922-CXW-02	Mercury	0.019	UJ	ug/L
C268889	09/08/2022	WL-11222680-080922-CXW-03	Mercury	0.019	UJ	ug/L

The following results are qualified due to method blank detections:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C244598	06/22/2022	WG-11222680-220622-CXW-01	Sulfate (dissolved)	6.9	J+	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-06	Sulfate (dissolved)	8.1	J+	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-07	Sulfate (dissolved)	3.9	U	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-08	Sulfate (dissolved)	3.6	U	mg/L
C244598	06/22/2022	WG-11222680-220622-CXW-09	Sulfate (dissolved)	3.5	U	mg/L
C244598	06/23/2022	WG-11222680-230622-CXW-10	Sulfate (dissolved)	3.3	U	mg/L
C244598	06/23/2022	WG-11222680-230622-CXW-11	Sulfate (dissolved)	4.2	U	mg/L
C244598	06/23/2022	WG-11222680-230622-CXW-12	Sulfate (dissolved)	1.3	U	mg/L

The following results are qualified due to field blank detections:

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C221453	04/01/2022	WG-11222680-010422-MJ-06	Ammonia-N	0.053	U	mg/L
C221453	04/01/2022	WG-11222680-010422-MJ-07	Ammonia-N	0.14	U	mg/L
C221453	04/01/2022	WG-11222680-010422-MJ-09	Ammonia-N	0.017	U	mg/L

The following results are qualified due to qualifying ion being outside of acceptance criteria. Results are tentatively identified and potentially biased high.

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C244592	06/23/2022	WL-11222680-230622-CXW-04	Anthracene	0.056	J+	ug/L

Lab Report #	Sample Date (mm/dd/yyyy)	Sample ID	Analyte	Result	Qualifier	Units
C291540	11/17/2022	WL-11222680-171122-CXW-02	Fluorene	0.053	J+	ug/L

Conclusion:

Based on the assessment detailed in the foregoing, the data summarized are acceptable with the specific qualifications and rejections noted above.

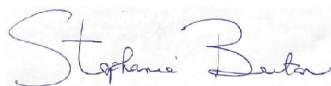
Notes:

- U – The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ – The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
- J – The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- J+ – The result is an estimated quantity, but the result may be biased high.
- J- – The result is an estimated quantity, but the result may be biased low.
- R – The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- N – Nitrogen
- RL – Reporting limit
- QA/QC – Quality Assurance/Quality Control

Data verification reference documents:

1. "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", USEPA 540/R-94-013, September 2016.
2. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", United States Environmental Protection Agency (USEPA) 540/R-99-008, September 2016.
3. "British Columbia Environmental Laboratory Manual", Analysis, Reporting & Knowledge Services Knowledge Management Branch Ministry of Environment and Climate Change Strategy Province of British Columbia, April 2020.

Regards



Stephanie Berton
Data Management - Data Validator

Appendix E

Concentration Versus Time Plots

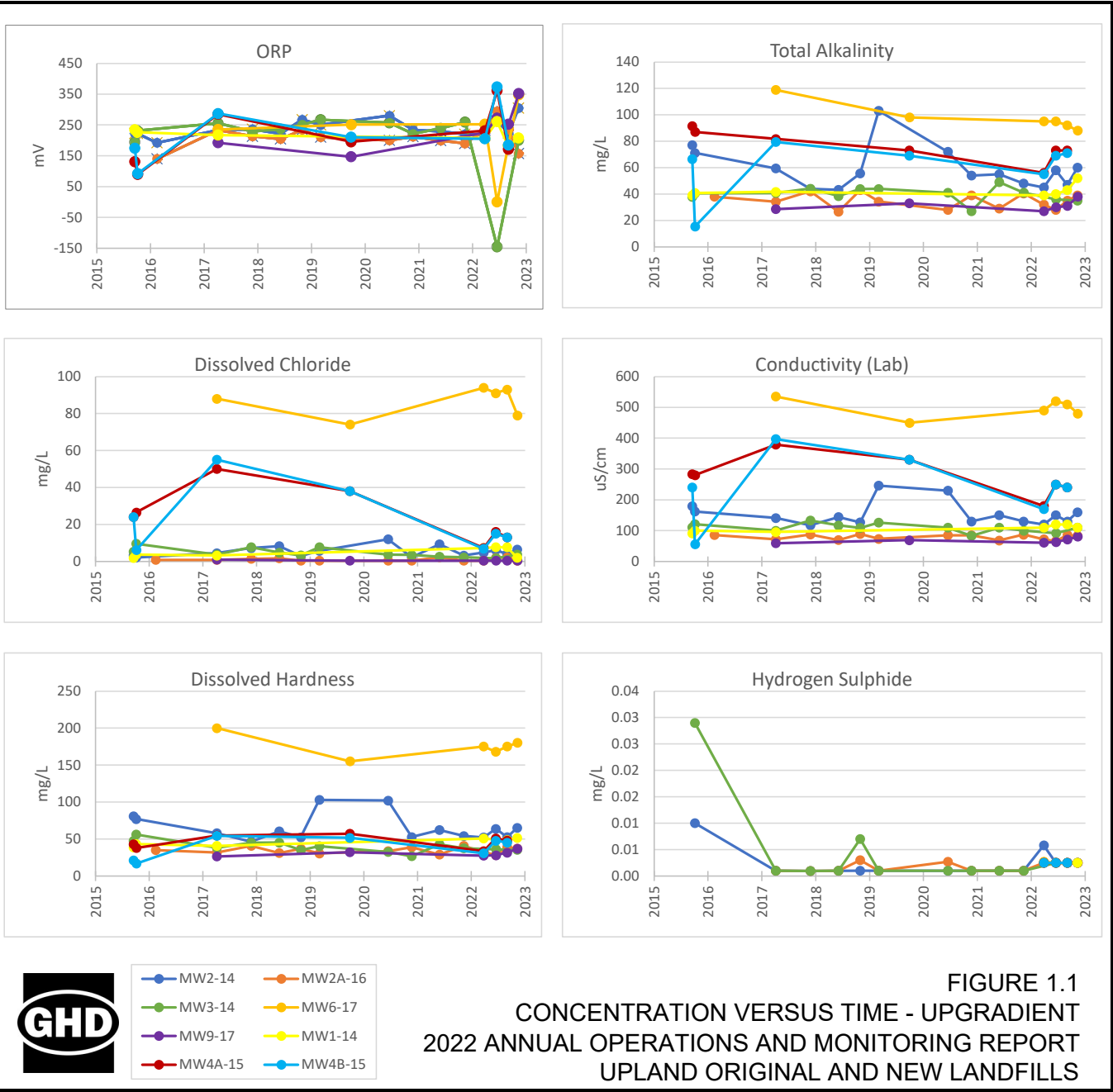


FIGURE 1.1
CONCENTRATION VERSUS TIME - UPGRADE
2022 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL AND NEW LANDFILLS

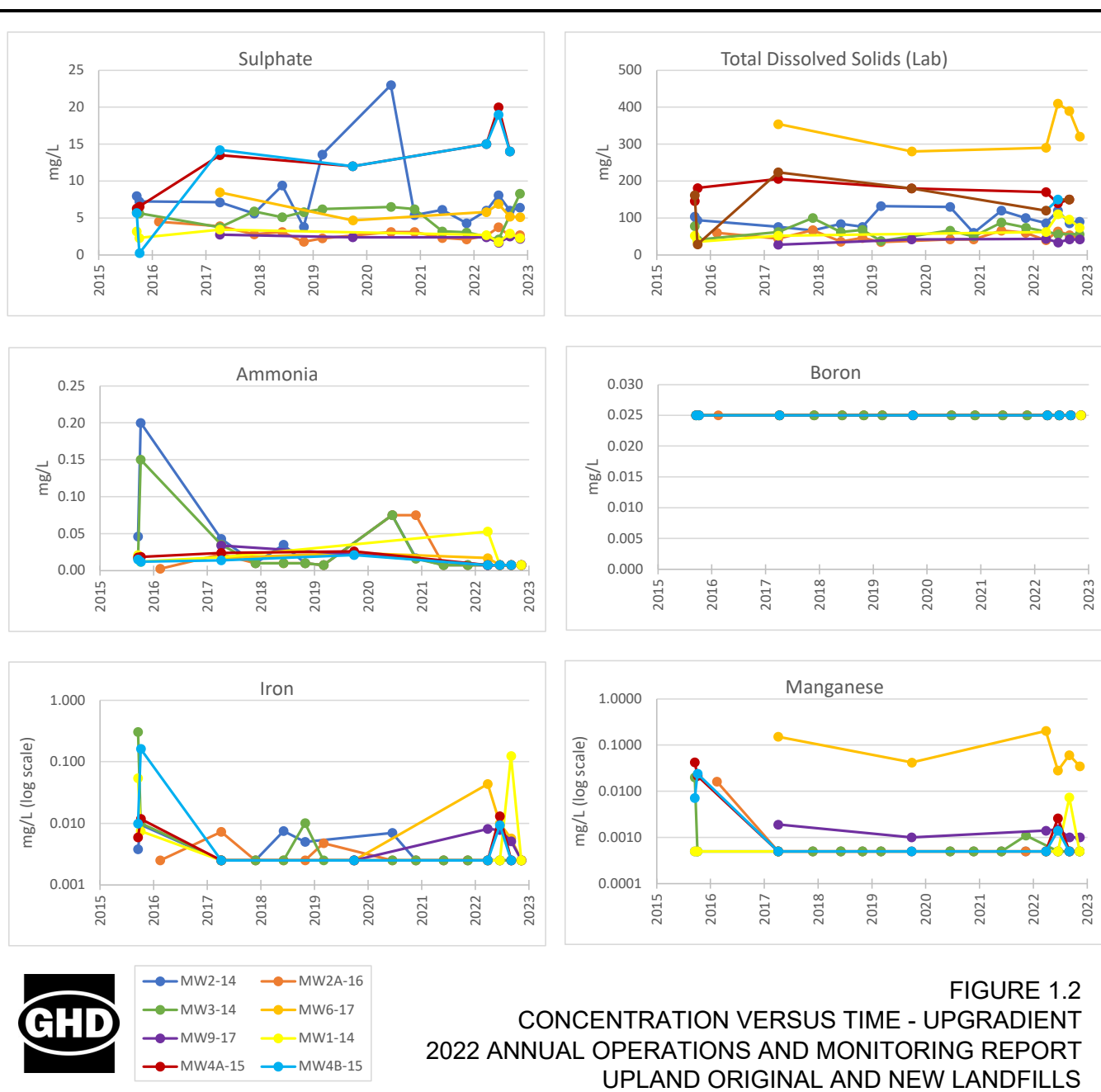
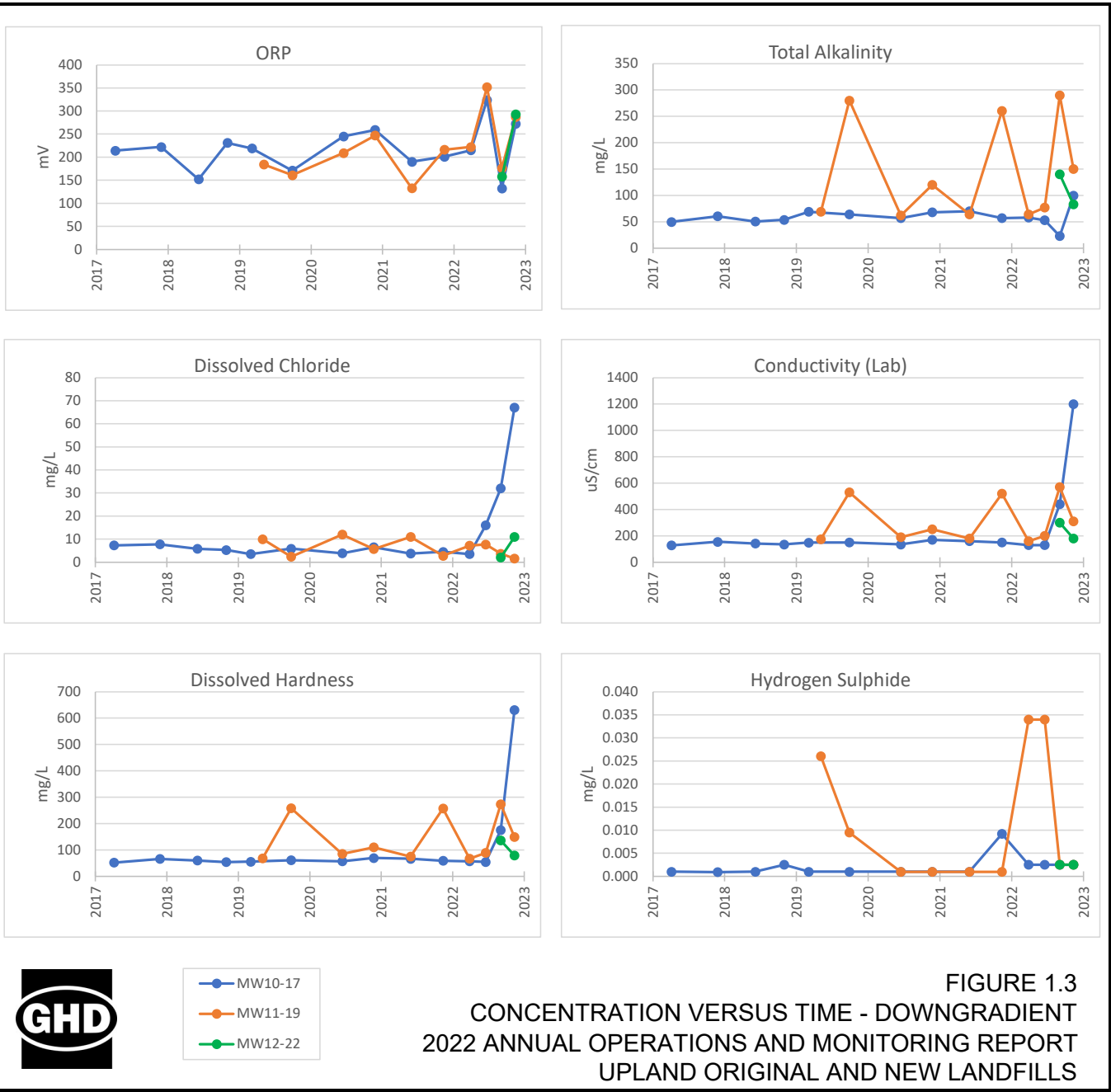
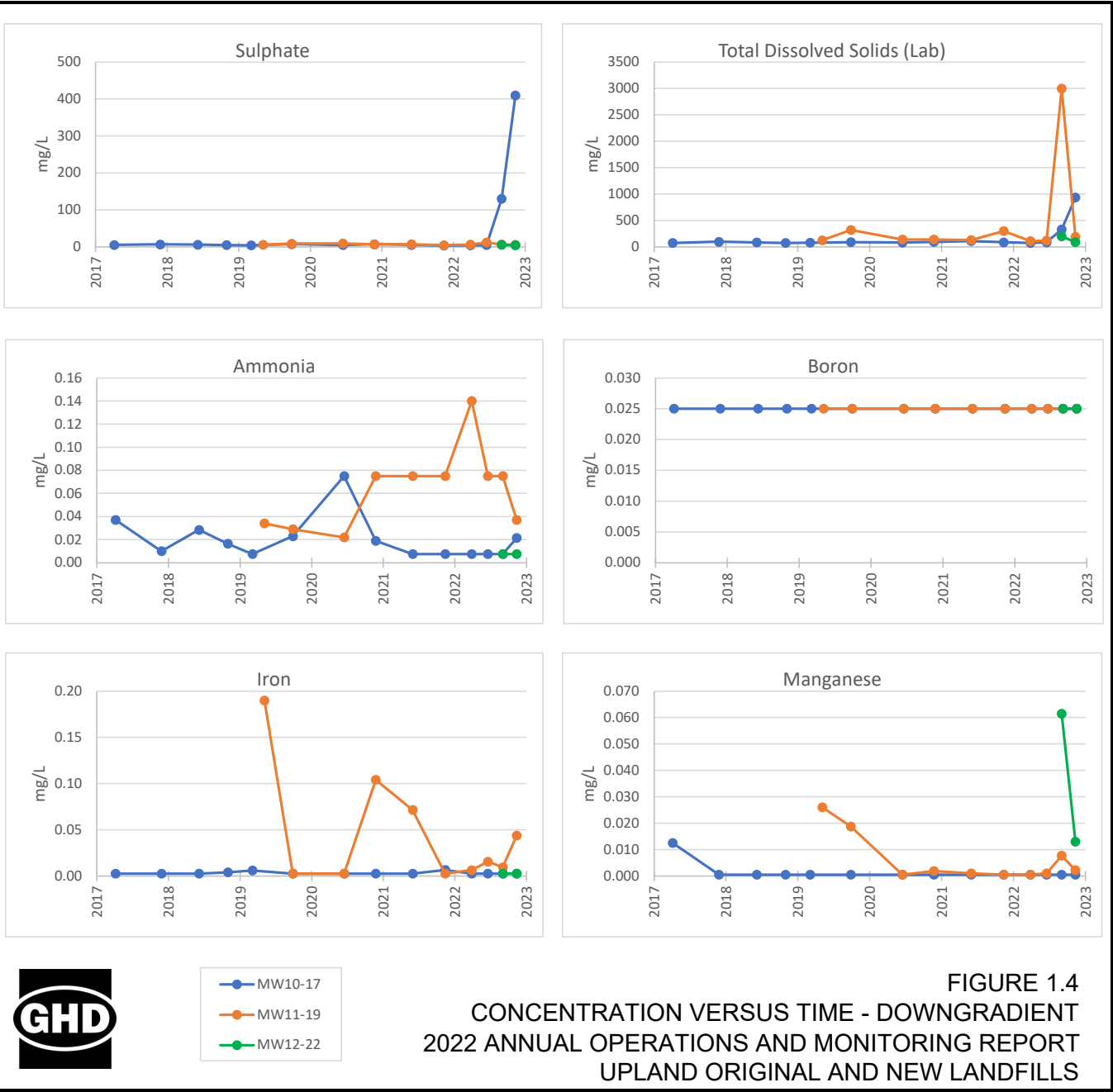


FIGURE 1.2
CONCENTRATION VERSUS TIME - UPGRADIENT
2022 ANNUAL OPERATIONS AND MONITORING REPORT
UPLAND ORIGINAL AND NEW LANDFILLS





Appendix F

Annual Status Form



AUTHORIZATION NUMBER: 107689

AUTHORIZATION TYPE: Refuse, Permit

LEGAL AUTHORIZATION HOLDER NAME: Upland Excavating Ltd.

AUTHORIZED PERSON NAME:

AUTHORIZED PERSON SIGNATURE:

SIGNATURE DATE:

I understand that it is an offense to mislead a government official, and I declare that all of the information presented is accurate and true.

I have been given the authority by the authorization holder to sign this form.

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
1.1.1	The maximum rate of waste discharge to the Original Lined Cell is 45,000 tonnes per calendar year.	Yes	N/A - waste was not discharged to the Original Landfill in 2022.
1.1.2	The characteristics of the waste discharge to the Original Lined Cell must be: (a) demolition waste, (b) construction waste, (c) land clearing waste, (d) soil in which the concentrations of all substances are less than the lowest applicable industrial land use standard specified for those substances in (i) the generic numerical soil standards, (ii) the matrix numerical soil standards, or (iii) a director's interim standard for soil, referred to in section 41(1)(a) of the Contaminated Sites Regulation, B.C. Reg. 375/96, (e) sludge from the Original Leachate Management Works, or, (f) other waste as authorized in writing by the director, but does not include: (g) hazardous waste except as authorized pursuant to the Hazardous Waste Regulation, controlled waste, Attractants, and, (h) waste and/or recyclable material prohibited in writing by the director.	Yes	N/A - waste was not discharged to the Original Landfill in 2022.
1.1.3	The waste discharge is authorized to the Original Lined Cell approximately located as shown on Site Plan A. Waste discharge to the Original Un-Lined Cell is not authorized.	Yes	N/A - waste was not discharged to the Original Landfill in 2022.
1.1.4	Authorization to discharge waste to the Original Lined Cell ceases on the earlier of: (i) the date the Original Lined Cell is filled to capacity with grades not steeper than 3H:1V (33%), (ii) the date of commencement of waste discharge to the New Landfill.	Yes	N/A - authorization to discharge waste to the Original Landfill ceased when the New Landfill commenced waste discharge on Nov 19, 2021.
1.1.5	The authorized works are: (i) a lined landfill footprint with a maximum area of 0.72 ha (85 m x 85 m) including from bottom to top a base with perimeter berm, 0.3 m sand cushion layer, 0.5 mm thick coated woven polyethylene liner, 0.3 m granular leak detection layer, leak detection riser pipe, 0.5 mm thick coated woven polyethylene liner, 0.3 m sand protection layer, leachate extraction chamber, final cover, and, (ii) an un-lined landfill footprint with an approximate area of 0.7 ha, final cover,	Yes	N/A - Refer to Section 2.1 of the annual report.
1.1.6	The operational certificate holder must ensure the Original Landfill, excluding final cover, is complete and fully operational on or before the date of issuance of this operational certificate, and at all times thereafter, until the Original Landfill is decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.	Yes	N/A
1.2.1	The operational certificate holder must convey the leachate from the Original Lined Cell, that is to be discharged on the Facility site, to the Original Leachate Management Works.	Yes	N/A - Refer to Condition 1.2.4 below and Section 2.2 of the annual report. Two batches of leachate were discharged to the New Landfill Leachate Management Works since the Original Landfill Leachate Management Works were decommissioned.
1.2.2	The maximum rate of treated leachate effluent discharge to the treated leachate infiltration pond is 7,139 m3 per calendar year.	Yes	N/A - Refer to Section 2.7 of the annual report.
1.2.3	The concentration of any substance in the treated leachate effluent discharge to the treated leachate infiltration pond must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance.	Yes	N/A - Refer to Section 2.7 of the annual report.
1.2.4	The treated leachate effluent is authorized to be discharged to the treated leachate infiltration pond and infiltrated into the ground. This authorization ceases on the date the Original Leachate Management Works are decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.	Yes	N/A - Refer to Section 2.2 of the annual report.
1.2.6	Minimum Freeboard must be maintained at all times as follows: treated leachate infiltration pond: 0.6 m	Yes	N/A
1.2.7	The operational certificate holder must ensure the Original Leachate Management Works are complete and fully operational on or before the date of commencement of discharge to the treated leachate infiltration pond, and at all times thereafter, until the Original Leachate Management Works are decommissioned in compliance with the plan referred to in section 2.9(a) (plan to remove all waste from the Original Landfill) of this operational certificate.	Yes	N/A - Refer to Section 2.2 of the annual report
1.3.1	The maximum rate of waste discharge to the New Landfill is: (45,000 minus the waste discharge to the Original Lined Cell) tonnes per calendar year.	Yes	N/A - Refer to Section 3.5 of the annual report.
1.3.2	The characteristics of the waste discharge to the New Landfill must be: (a) demolition waste, (b) construction waste, (c) land clearing waste, (d) soil in which the concentrations of all substances are less than the lowest applicable industrial land use standard specified for those substances in (i) the generic numerical soil standards, (ii) the matrix numerical soil standards, or (iii) a director's interim standard for soil, referred to in section 41(1)(a) of the Contaminated Sites Regulation, B.C. Reg. 375/96, (e) sludge from the New Leachate Management Works or the New Stormwater Management Works, or, (f) other waste as authorized in writing by the director, but does not include: (g) hazardous waste except as authorized pursuant to the Hazardous Waste Regulation, controlled waste, Attractants, and, (h) waste and/or recyclable material prohibited in writing by the director.	Yes	N/A - Refer to Section 3.5 of the annual report.
1.3.3	The waste discharge is authorized to the New Landfill approximately located as shown on Site Plan A.	Yes	N/A - Refer to Section 3.5 of the annual report.
1.3.6	The operational certificate holder must ensure the New Landfill, excluding final cover, is complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.	Yes	N/A - Refer to Section 3.1 of the annual report.
1.4.1	The operational certificate holder must convey the leachate from the New Landfill, that is to be discharged on the Facility site, to the New Leachate Management Works.	Yes	N/A - Refer to Section 3.2 of the annual report.
1.4.2	The maximum rate of treated leachate effluent discharge to the treated leachate infiltration pond is 24,633 m3 per calendar year.	Yes	N/A - Refer to Section 3.7 of the annual report.
1.4.3	The concentration of any substance in the treated leachate effluent discharge to the treated leachate infiltration pond must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance.	Yes	N/A - Refer to Section 3.7 of the annual report.
1.4.4	The treated leachate effluent is authorized to be discharged to the treated leachate infiltration pond and infiltrated into the ground.	Yes	N/A - Refer to Section 3.7 of the annual report.
1.4.5	The authorized works are leachate conveyance, treatment and discharge works including pumps, pipes, leachate treatment pond(s), treated leachate infiltration pond, flow monitoring works, and related appurtenances approximately located as shown on Site Plan A.	Yes	N/A - Refer to Section 3.2 of the annual report.
1.4.7	Minimum Freeboard must be maintained at all times as follows: leachate treatment pond(s): 0.6 m treated leachate infiltration pond: 0.6 m	Yes	N/A
1.4.8	The operational certificate holder must ensure the New Leachate Management Works are complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter	Yes	N/A - Refer to Section 3.2 of the annual report.



AUTHORIZATION NUMBER: 107689

AUTHORIZATION TYPE: Refuse, Permit

LEGAL AUTHORIZATION HOLDER NAME: Upland Excavating Ltd.

AUTHORIZED PERSON NAME:

AUTHORIZED PERSON SIGNATURE:

SIGNATURE DATE:

I understand that it is an offense to mislead a government official, and I declare that all of the information presented is accurate and true.
I have been given the authority by the authorization holder to sign this form.

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
1.5.1	The operational certificate holder must manage stormwater from the New Landfill such that stormwater is infiltrated into the ground with the authorized works.	Yes	N/A - Refer to Section 3.3 of the annual report
1.5.2	The stormwater must not include leachate and the concentration of any substance in the stormwater must not be greater than the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance	Yes	N/A - Refer to Section 8.4. The east and west stormwater ditches were dry during the 2022 EMP events.
1.5.4	Minimum Freeboard must be maintained at all times as follows: stormwater infiltration area: 0.6 m all other authorized works: 0.3 m	Yes	N/A
1.5.5	The operational certificate holder must ensure that adequate authorized works to manage stormwater, such that stormwater is infiltrated into the ground with the authorized works, are complete and fully operational on or before the date of commencement of waste discharge to the New Landfill, and at all times thereafter.	Yes	N/A - Refer to Section 3.3 of the annual report
2.70	Before a specific quantity of soil is accepted at the Facility, the operational certificate holder must cause a Qualified Professional to certify and submit to the operational certificate holder, a document pertaining to the specific quantity of soil that includes: (i) the soil tonnage(s) and soil quality class(es) as described in the most recent version of Technical Guidance 1 on Contaminated Sites Site Characterization and Confirmation Testing, (ii) the soil origin including applicable civic address, site identification number, parcel identifier, parcel identification number, legal description, and, (iii) characterization of the soil in accordance with ministry procedures and applicable Contaminated Sites Regulation Guidance, Protocols and Procedures.	Yes	N/A - Refer to Section 3.3 of the annual report.
2.11	The operational certificate holder must cause a Qualified Professional to carry out inspections before and during the construction or modification of Significant Works, and, after the completion of construction or modification of Significant Works, to certify and submit construction report(s) to the director for all Significant Works, on or before 60 days after the completion of construction or modification of the Significant Works.	Yes	N/A - Refer to Sections 3.1 of the annual report (i.e., construction reports)
2.1	The operational certificate holder must notify the director of the date of commencement of waste discharge to the Original Lined Cell, on that date.	Yes	N/A
3.1	The operational certificate holder must provide and install multiple and/or spare works and auxiliary power facilities to ensure the Original Lined Cell, Original Leachate Management Works, New Landfill, New Leachate Management Works, and New Storm water Management Works, are complete and fully operational as specified in this operational certificate, including during maintenance, breakdowns and electrical power outages.	Yes	N/A
3.2	The operational certificate holder must cause persons that are qualified and trained to operate, regularly inspect, and maintain the Facility, in good working order. If components of the Facility have a manufacturer's recommended maintenance schedule, then those components must, at a minimum, be maintained in accordance with that schedule.	Yes	N/A
3.2	The operational certificate holder must prepare documents of the qualification and training of the persons operating, inspecting and maintaining the Facility, and of Facility inspections, operation and maintenance.	Yes	N/A
3.3	The operational certificate holder must ensure that at least one person responsible for the management of the Facility is certified, and maintains certification, by The Solid Waste Association of North America (SWANA) as a Manager of Landfill Operations, and at least one person responsible for the operation of the Facility has, within the preceding five years, successfully completed the SWANA Landfill Operations Basics course, on or before the earlier of: (i) the date of commencement of waste discharge to the Original Lined Cell, (ii) the date of commencement of waste discharge to the New Landfill, and at all times thereafter.	Yes	N/A
3.3	The operational certificate holder must prepare documents of the SWANA certification and training of the person(s) responsible for the management and operation of the Facility.	Yes	N/A
3.5	The operational certificate holder must ensure that the Facility does not cause the concentration of any substance in groundwater flowing from the Facility site boundary to be greater than: (i) the Contaminated Sites Regulation Generic Numerical Water Standards for Drinking Water (DW), for that substance, or (ii) if the local background concentration of any substance is greater than (i), the local background concentration of that substance.	Yes	N/A - Refer to Section 7.3 of the annual report.
3.7	The operational certificate holder must ensure that the Facility does not cause a nuisance including with regard to birds, rodents, insects, odour, noise, dust, litter, vector and wildlife attraction.	Yes	N/A
3.8	The operational certificate holder must prepare documents of complaints with regard to matters relevant to this operational certificate, including environmental and nuisance complaints. These documents must include the source and nature of the complaint, actions, responses, and corresponding dates and times.	Yes	N/A
4.1	The operational certificate holder must carry out required sampling in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2013 Edition (Permittee)" or most recent edition, or by alternative procedures as authorized by the director.	Yes	N/A - Refer to Section 5.5 of the annual report.
4.2	The operational certificate holder must carry out required analyses in accordance with procedures described in the "British Columbia Laboratory Manual (2015 Permittee Edition)", or the most recent edition or by alternative procedures as authorized by the director.	Yes	N/A - Refer to Sections 5.6 of the annual report.
4.3	The operational certificate holder must obtain from the analytical laboratory(ies) their precision, accuracy and blank data for each sample set submitted by the operational certificate holder and an evaluation of the data acceptability, based on criteria set by such laboratory.	Yes	N/A - Refer to AppD of the annual report.
4.3	The operational certificate holder must submit samples to analytical laboratory(ies) that meet the definition of a qualified laboratory under the Environmental Data Quality Assurance Regulation.	Yes	N/A - Refer to Section 5.6 of the annual report.
4.3	The operational certificate holder must collect, prepare and submit for analysis by the analytical laboratory(ies) quality control (QC) samples for each parameter. As a minimum, the number of QC samples should be 20% of all samples collected (environmental + QC samples) within 48 hours of each other, and include duplicate, field and trip blank samples for each parameter.	Yes	N/A - Refer to AppB of the annual report.



AUTHORIZATION NUMBER: 107689

AUTHORIZATION TYPE: Refuse, Permit

LEGAL AUTHORIZATION HOLDER NAME: Upland Excavating Ltd.

AUTHORIZED PERSON NAME:

AUTHORIZED PERSON SIGNATURE:

SIGNATURE DATE:

I understand that it is an offense to mislead a government official, and I declare that all of the information presented is accurate and true.

I have been given the authority by the authorization holder to sign this form.

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
5.2	The operational certificate holder must immediately notify the director or designate by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the director of any non-compliance with the requirements of this authorization by the operational certificate holder and must take remedial action to remedy any effects of such non-compliance.	Yes	N/A - No non-compliances. Refer to Sections 2.8 and 3.8 of the annual report.
5.2	The operational certificate holder must provide the director with written confirmation of all non-compliance events, including available test results within 24 hours of the original notification by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the director.	Yes	N/A - No non-compliances. Refer to Sections 2.8 and 3.8 of the annual report.
5.3	If the operational certificate holder fails to comply with any of the requirements of this authorization, the operational certificate holder must, within 30 days of such non-compliance, submit to the director a written report that is satisfactory to the director and includes, but is not necessarily limited to, the following: (i) all relevant test results obtained by the operational certificate holder related to the non-compliance, ii) an explanation of the most probable cause(s) of the non-compliance, and (iii) a description of remedial action planned and/or taken by the operational certificate holder to prevent similar non-compliance(s) in the future.	Yes	N/A - No non-compliances. Refer to Sections 2.8 and 3.8 of the annual report.
5.3	The operational certificate holder must submit all non-compliance reporting required to be submitted under this section by email to the Ministry's Compliance Reporting Submission Mailbox at EnvironmentalCompliance@gov.bc.ca or as otherwise instructed by the director.	Yes	N/A - No non-compliances. Refer to Sections 2.8 and 3.8 of the annual report.
5.4	The operational certificate holder must cause a Qualified Professional to certify and submit an Annual Operations and Monitoring Report in a format suitable for public release, for the preceding calendar year, to the director on or before March 31 of each year. On or before March 31 of each year, the operational certificate holder must post a copy of the Annual Operations and Monitoring Report online, on a website accessible to the public, and in accordance with any requirements of the director.	Yes	N/A
5.4	The Annual Operations and Monitoring Report must include a summary of OCP implementation that addresses the information in section 2.3(b), and summary of DOCP implementation that addresses the information in 2.5(b), of this operational certificate.	Yes	N/A - Refer to sections 2.3 and 3.3 of the annual report.
5.4	The Annual Operations and Monitoring Report must include a summary of construction reports.	Yes	N/A - Refer to section 3.1 of the annual report.
5.4	The Annual Operations and Monitoring Report must include annual and cumulative tonnages and categories of waste including soil tonnage(s) and soil quality class(es) discharged to the Original Lined Cell and to the New Landfill.	Yes	N/A - Refer to sections 2.5 and 3.5 of the annual report.
5.4	The Annual Operations and Monitoring Report must include remaining volume and life of the Original Lined Cell and of the New Landfill.	Yes	N/A - the decommissioning of the Original Landfill began in 2022.
5.4	The Annual Operations and Monitoring Report must include a summary of treated leachate effluent quantity and quality discharged to the treated leachate infiltration pond.	Yes	N/A - Refer to sections 2.7 and 3.7 of the annual report.
5.4	The Annual Operations and Monitoring Report must include a summary of complaints and nuisances and description of remedial action planned and/or taken by the operational certificate holder to prevent similar complaints and nuisances in the future.	Yes	N/A - Refer to sections 2.9 and 3.9 of the annual report.
5.4	The Annual Operations and Monitoring Report must include a summary of non-compliance notifications and non-compliance reporting and description of remedial action planned and/or taken by the operational certificate holder to prevent similar non-compliance(s) in the future.	Yes	N/A - Refer to sections 2.8 and 3.8 of the annual report.
5.4	The Annual Operations and Monitoring Report must include an annual status form in accordance with the instructions and template at the ministry website https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/annual-status-form	Yes	N/A - Refer to this form (Appendix F of the annual report).
5.4	The Annual Operations and Monitoring Report must include a summary of OCP and DOCP implementation, and construction of Significant Works, planned for the next calendar year.	Yes	N/A - Refer to sections 2.3, 2.4, 3.3 and 3.4 of the annual report.
5.4	The Environmental Monitoring Plan Report must include site plan(s), sampling locations, storm water flow paths, groundwater elevations, gradients and flow directions.	Yes	N/A - Refer to Figures of the annual report.
5.4	The Environmental Monitoring Plan Report must include data including laboratory analysis and quality assurance and quality control results.	Yes	N/A - Refer to Appendices C and D of the annual report.
5.4	The Environmental Monitoring Plan Report must include data tabulation, trend analysis, graphs, diagrams, and interpretation.	Yes	N/A - Refer to Tables and AppE of the annual report.
5.4	The Environmental Monitoring Plan Report must include trigger level assessment plan monitoring, data, results and interpretation.	Yes	N/A - A trigger level assessment plan is not needed for the Original Lined Cell, the New Landfill EMP includes a trigger level response plan.
5.4	The Environmental Monitoring Plan Report must include any determination(s) of the local background concentration of substance(s) in accordance with section 3.5 of this operational certificate.	Yes	N/A - Local determination(s) on local background concentration of substances was not needed.
5.4	The Environmental Monitoring Plan Report must include comparison of the data with the standards for treated leachate effluent discharge, storm water quality, groundwater quality, and landfill gas management, specified in sections 1.2, 1.4, 1.5, 3.5 and 3.6 of this operational certificate, and identification of any non-compliance and predicted future non-compliance.	Yes	N/A - Refer to Section 3.7, Appendix C, and the tables of the annual report.
5.4	The Environmental Monitoring Plan Report must include results, conclusions, recommendations and changes to the environmental monitoring plan.	Yes	N/A - Refer to sections 9 and 10 of the annual report.
5.4	The operational certificate holder must upload monitoring data associated with this operational certificate to the Ministry's Environmental Monitoring System (EMS) database, within 45 days of the end of the 3 month period in which the data is collected.	Yes	N/A - Data has been uploaded to the EMS by the laboratory.

Appendix G

2023 Environmental Monitoring Plan

Environmental Monitoring Program Specification - 2023

PROJECT: New Landfill EMP
CLIENT: Northwin Environmental
PROJECT NO.: 11222680.15
PROJECT MANAGER: Rose Marie Rocca

MONITORING STAFF:	RESPONSIBILITY
Kathleen Hasler	Field Lead
Caryn Wong	Field Technician
Stephanie Berton	Project Chemist
Tristan Haddas	Database Analyst

LABORATORIES USED: ALS Environmental, Burnaby, British Columbia

AUTHORIZATION:	MONITORING EVENT(S)	PC/PM SIGNATURE
	Mar/Apr, Jun, Aug/Sep, Nov	_____

Revision #	Date	Revision	GHD
1	January 2022	Specification was developed based on the DOCP, dated July 8, 2021	RMR
2	April 2022	Typo in 2022 EMP Spec was corrected, from MW12-17 to MW11-19.	RMR
3	August 2022	MW3-14 was added to the groundwater monitoring program as a downgradient compliance well, to be sampled semi-annually in 2022. This well was sampled in June 2022, as part of the original EMP, the analytical results will be for the New Landfill EMP as well. In 2023, this well will be sampled quarterly.	RMR
4	August 2022	MW12-22 was added to the groundwater monitoring specification as a downgradient compliance well following its installation, to be sampled quarterly. Renamed LS1 to LDMP-1 and renamed LS2 to LDMP-2. Added LDS, LDMP-3 and LDMP-4. These changes were made to the leak detection monitoring program to account for as built conditions. Added phenols to the leachate analytical parameter list, to be analyzed annually due to presence of wood waste.	RMR
5	September 2022	Updated QAQC Samples. Added LW-PFAS to field blank's analytical list in Q4.	KH

Revision #	Date	Revision	GHD
6	March 2023	Added semi-annual water level monitoring to the full groundwater well network. Removed East and West surface water ditch from the EMP until final cover is placed on the New Landfill. Added Cell 1 West leachate sump to the quarterly leachate monitoring program. Samples will be collected following the discharge of waste to the cell.	RMR

Monitoring Schedule: Table 1
 Groundwater Analytical Parameters: Table 2
 Surface Water Analytical Parameters: Table 3
 Leachate Analytical Parameters Table 4
 Notes Page 7

Note for Staff – Labelling error on casing:

LFG1-22 labelled as “SVP1-22” on casing.
 LFG2-22 labelled as “SVP2-22” on casing.





Table 1

Environmental Monitoring Program Specification - 2023 Monitoring Schedule New Landfill							
Monitoring Location	Purpose	Sample Matrix	Quarterly Hydraulic Monitoring	March/ April	June	August/ September	November
Groundwater Monitoring (19 WL Locations, 12 Sampling Locations)							
Upgradient Monitoring Wells (5 Locations)							
MW6-17	To monitor upgradient groundwater quality.	WG	Q	√	√	√	√
MW9-17	To monitor upgradient groundwater quality.	WG	Q	√	√	√	√
MW1-14	To monitor upgradient groundwater quality.	WG	Q	√	√	√	√
MW4A-15	To monitor upgradient groundwater quality.	WG	Q	√	√	√	√
MW4B-15	To monitor upgradient groundwater quality.	WG	Q	√	√	√	√
Cross-Gradient Monitoring Wells (2 Locations)							
MW2-14	To monitor cross-gradient groundwater quality.	WG	Q	√	√	√	√
MW2A-16	To monitor cross-gradient groundwater quality.	WG	Q	√	√	√	√
Downgradient Compliance Monitoring Wells (4 Locations, 1 Proposed Location)							
MW10-17	To monitor downgradient groundwater quality near the east property boundary.	WG	Q	√	√	√	√
MW12-22	To monitor downgradient groundwater quality at the south property boundary.	WG	Q	√	√	√	√
MW11-19	To monitor downgradient groundwater quality at the south east corner of the site.	WG	Q	√	√	√	√
MW3-14	To monitor groundwater quality immediately downgradient of Phase 1 East Landfill Cell.	WG	Q	√	√	√	√
MW13 (proposed)	To monitor groundwater quality immediately downgradient of the landfill. Sample once installed.	WG	Q	√	√	√	√
MW5A-15, MW5B-15, MW7-17, MW8-17, MW15A-18, MW15B-18, PZ1-19		WG	Q	-	-	-	-
Surface Water Monitoring (4 Monitoring Locations, 2 Sampling Locations)							
Rico Gauge	To monitor the water level in Rico Lake via surface water gauge.	N/A	Q	-	-	-	-
SW15-02	To monitor surface water quality in Rico Lake	WS	N/A	-	-	-	√
Mclvor Lake	To monitor the water level in Mclvor Lake via BC Hydro Data Records - use link in notes below. Look up and record on day of monitoring event - data is only available for a limited period on BC Hydro website ⁵	N/A	Q	-	-	-	-
SW15-01	To monitor surface water quality in Mclvor Lake	WS	N/A	-	-	-	√
Leachate Monitoring (3 Locations)							
S06-21	To characterize leachate quality collected from the Leachate Sump at northeast end of Cell 1 West. Sampling location is from the leachate collection system sump riser pipe.	WL	N/A	√	√	√	√
TLIP ²	To assess leachate treatment performance and determine if changes to the treatment process are required. Only collect sample if Upland is currently discharging treated leachate into pond. Sampling location is the end of the leachate discharge pipe.	WL	N/A	√	√	√	√
S07-YY	To characterize leachate quality collected from the Leachate Sump in Cell 1 West. Monitoring will begin once waste has been discharged to this cell.	WL	N/A	√	√	√	√
Leak Detection Monitoring Program (5 Locations)							
LDS	To monitor leakage at the primary liner of the landfill as part of the Trigger Level Response Plan. If water is present, collect a sample. Access to the leak detection sump is on the north side of the landfill.	W	Q	√	√	√	√
LDMP-1	To monitor leakage at the primary liner of the landfill, as part of the Trigger Level Response Plan. Access to the Leak Detection Monitoring Pipe is on the north side of the landfill. If water is present call PM	W	Q	-	-	-	-
LDMP-2	To monitor leakage at the primary liner of the landfill, as part of the Trigger Level Response Plan. Access to the Leak Detection Monitoring Pipe is on the north side of the landfill. If water is present call PM	W	Q	-	-	-	-
LDMP-3	To monitor leakage at the primary liner of the landfill, as part of the Trigger Level Response Plan. Access to the Leak Detection Monitoring Pipe is on the east side of the landfill. If water is present call PM	W	Q	-	-	-	-
LDMP-4	To monitor leakage at the primary liner of the landfill, as part of the Trigger Level Response Plan. Access to the Leak Detection Monitoring Pipe is on the east side of the landfill. If water is present call PM	W	Q	-	-	-	-
Landfill Gas in Soil Monitoring (2 Locations)							
LFG1-22	To monitor landfill gas migration.	n/a	Q ⁴	-	-	-	√
LFG2-22	To monitor landfill gas migration.	n/a	Q ⁴	-	-	-	√
Field Quality Assurance/Quality Control (QA/QC) ³							
Field Blank		WG	-	√	√	√	-
Field Blank for Leachate - PFAS Only		WG	-	-	-	-	√
Trip Blank - BTEX/VPH Only		WL/W	-	-	-	-	√
Groundwater Duplicate		WG	-	√	√	√	√
Leachate Duplicate		WL	-	√	√	√	-
Notes:							
² - Treated Leachate Infiltration Pond (TLIP). Only collect a sample if Upland is currently discharging treated leachate into the pond. Sample collection point is the end of the treated leachate discharge pipe/hose. Do not collect stagnant leachate from the pond. Confirm with Upland if treated leachate effluent can be forced to discharge.							
³ - The number of QC samples should be 20% of all samples collected within 48 hours of each other; and include duplicate, field blank, and trip blank samples for each parameter. Add QA/QC samples to the November event if 20% has not been reached.							
⁴ - Collect water level only if screen is blocked and a landfill gas in soil cannot be measured.							
⁵ - Mclvor Lake water level. Look up current water level at the Ladore Dam: https://www.bchydro.com/energy-in-bc/operations/transmission-reservoir-data/previous-reservoir-elevations/vancouver_island/ladore_ldr.html							

Table 2

Environmental Monitoring Program Specification - 2023
Groundwater Analytical Parameters
New Landfill
Northwin Environmental, Campbell River, BC

Groundwater (WG)	Quarterly			
	Mar/Apr	Jun	Aug/Sep	Nov
Water Level Monitoring				
Depth to Water	√	√	√	√
Depth to Bottom	√	√	√	√
Field Parameters				
Conductivity (uS/cm)	√	√	√	√
Oxidation reduction potential (mV)	√	√	√	√
pH (s.u.)	√	√	√	√
Temperature (deg C)	√	√	√	√
Total dissolved solids (mg/L)	√	√	√	√
Turbidity (ntu)	√	√	√	√
General Chemistry				
Alkalinity (Speciated)	√	√	√	√
Conductivity	√	√	√	√
Chloride	√	√	√	√
Sulphate	√	√	√	√
Total Sulphide (Low Level) + H ₂ S Calc	√	√	√	√
Total Sulphide, Un-ionized (as H ₂ S) (Calc)	√	√	√	√
Nitrate (as N)	√	√	√	√
Nitrite (as N)	√	√	√	√
Nitrite/Nitrate (N+N)	√	√	√	√
Orthophosphate	√	√	√	√
Total Dissolved Solids (TDS)	√	√	√	√
Nutrients				
Ammonia Nitrogen	√	√	√	√
Metals				
Dissolved CSR Metals (Incl. Hg)	√	√	√	√
Dissolved Hardness (as CaCO ₃)	√	√	√	√
Other				
LEPH/HEPH (Incl. PAH/EPH)	√	√	√	√

Table 3

Environmental Monitoring Program Specification - 2023
Surface Water Analytical Parameters
New Landfill
Northwin Environmental, Campbell River, BC

Surface Water (WS)	Quarterly			
	Mar/Apr	Jun	Aug/Sep	Nov
Water Level Monitoring				
Water level at Rico Gauge	√	√	√	√
Record water level using BC Hydro Data Records - use link in Table 1.	√	√	√	√
Field Parameters				
Conductivity (uS/cm)	√	√	√	√
Oxidation reduction potential (mV)	√	√	√	√
pH (s.u.)	√	√	√	√
Temperature (deg C)	√	√	√	√
Total dissolved solids (mg/L)	√	√	√	√
Turbidity (ntu)	√	√	√	√
General Chemistry				
Alkalinity (Speciated)	√	√	√	√
Conductivity	√	√	√	√
Chloride	√	√	√	√
Sulphate	√	√	√	√
Total Sulphide (Low Level) + H ₂ S Calc	√	√	√	√
Total Sulphide, Un-ionized (as H ₂ S) (Calc)	√	√	√	√
Nitrate (as N)	√	√	√	√
Nitrite (as N)	√	√	√	√
Nitrite/Nitrate (N+N)	√	√	√	√
Orthophosphate	√	√	√	√
Total Suspended Solids (TSS)	√	√	√	√
Nutrients				
Ammonia Nitrogen	√	√	√	√
Metals				
Total CSR Metals (Incl. Hg)	√	√	√	√
Dissolved Hardness (as CaCO ₃)	√	√	√	√
Other				
LEPH/HEPH (Incl. PAH/EPH) ¹	-	-	-	-

1 - If leachate concentrations for LEPH/HEPH are 80% within CSR 3.2 Aquatic Life Criteria, include LEPH/HEPH analysis in surface water during the next event

Table 4

Environmental Monitoring Program Specification - 2023
Leachate Analytical Parameters
New Landfill
Northwin Environmental, Campbell River, BC

Leachate (WL)	Quarterly			
	Mar/Apr	Jun	Aug/Sep	Nov
Water Level Monitoring				
Depth to Water	√	√	√	√
Depth to Bottom	√	√	√	√
Field Parameters				
Conductivity (uS/cm)	√	√	√	√
Oxidation reduction potential (mV)	√	√	√	√
pH (s.u.)	√	√	√	√
Temperature (deg C)	√	√	√	√
Total dissolved solids (mg/L)	√	√	√	√
Turbidity (ntu)	√	√	√	√
General Chemistry				
Alkalinity (Speciated)	√	√	√	√
Conductivity	√	√	√	√
Chloride	√	√	√	√
Sulphate	√	√	√	√
Total Sulphide (Low Level) + H ₂ S Calc	√	√	√	√
Total Sulphide, Un-ionized (as H ₂ S) (Calc)	√	√	√	√
Nitrate (as N)	√	√	√	√
Nitrite (as N)	√	√	√	√
Nitrite/Nitrate (N+N)	√	√	√	√
Orthophosphate	√	√	√	√
Biological Oxygen Demand (Total) (BOD5)	√	√	√	√
Chemical Oxygen Demand (COD)	√	√	√	√
Total Dissolved Solids (TDS)	√	√	√	√
Total Suspended Solids (TSS)	√	√	√	√
Nutrients				
Ammonia Nitrogen	√	√	√	√
Metals				
Total CSR Metals (Incl. Hg)	√	√	√	√
Dissolved Hardness (as CaCO ₃)	√	√	√	√
Other				
LEPH/HEPH (Incl. PAH/EPH)	√	√	√	√
PFOS, PFOA, PFBS	-	-	-	√
BTEX/VPH	-	-	-	√
Phenols	-	-	-	√

Table 5

Environmental Monitoring Program Specification - 2023
Leak Detection Water Analytical Parameters
New Landfill
Northwin Environmental, Campbell River, BC

Leak Detection Water (W)	Quarterly			
	Mar/Apr	Jun	Aug/Sep	Nov
Water Level Monitoring				
Depth to Water	√	√	√	√
Depth to Bottom	√	√	√	√
Field Parameters				
Conductivity (uS/cm)	√	√	√	√
Oxidation reduction potential (mV)	√	√	√	√
pH (s.u.)	√	√	√	√
Temperature (deg C)	√	√	√	√
Total dissolved solids (mg/L)	√	√	√	√
Turbidity (ntu)	√	√	√	√
General Chemistry				
Alkalinity (Speciated)	√	√	√	√
Conductivity	√	√	√	√
Chloride	√	√	√	√
Sulphate	√	√	√	√
Total Sulphide (Low Level) + H ₂ S Calc	√	√	√	√
Total Sulphide, Un-ionized (as H ₂ S) (Calc)	√	√	√	√
Nitrate (as N)	√	√	√	√
Nitrite (as N)	√	√	√	√
Nitrite/Nitrate (N+N)	√	√	√	√
Orthophosphate	√	√	√	√
Biological Oxygen Demand (BOD)	√	√	√	√
Chemical Oxygen Demand (COD)	√	√	√	√
Total Dissolved Solids (TDS)	√	√	√	√
Total Suspended Solids (TSS)	√	√	√	√
Nutrients				
Ammonia Nitrogen	√	√	√	√
Metals				
Total CSR Metals (Incl. Hg)	√	√	√	√
Dissolved Hardness (as CaCO ₃)	√	√	√	√
Other				
LEPH/HEPH (Incl. PAH/EPH)	√	√	√	√
PFOS, PFOA, PFBS	-	-	-	√
BTEX/VPH	-	-	-	√
Phenols	-	-	-	√

