2022 ANNUAL MONITORING REPORT

QUESNEL MUNICIPAL LANDFILL

CITY OF QUESNEL

PROJECT NO.: KX05593
DATE: MARCH 2023

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“Effective September 21, 2022, Wood Environment & Infrastructure Solutions Canada Limited is now operating as WSP E&I Canada Limited. No other aspects of our legal entity, contractual terms or capabilities have changed in relation to this report submission.”

March 3rd, 2023

Derek Kitamura
Public Works Supervisor/Landfill Manager
City of Quesnel
410 Kinchant St
Quesnel, BC V2J 7J5

Dear Derek:

Re: 2022 Annual Monitoring Report, Quesnel Municipal Landfill

WSP E&I Canada Limited (WSP) is providing two (2) copy of the final report summarizing the field work and associated laboratory results completed for the 2022 groundwater monitoring program at the Quesnel Municipal Landfill, in Quesnel, BC.

We trust this report satisfies your present requirements. If there are any questions or comments concerning this report, please contact the undersigned.

Yours sincerely,

Maylee, P.Eng.
Environmental Engineer

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QUALITY MANAGEMENT

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1 INTRODUCTION

WSP E&I Canada Limited (previously Wood Environment & Infrastructure Solutions) (WSP) was retained by the City of Quesnel (the City) to conduct the 2022 Annual Groundwater Monitoring Program at the City of Quesnel Municipal Landfill (the Landfill). The groundwater monitoring program was completed as required by the British Columbia Ministry of Environment and Climate Change Strategy (BC ENV) under the existing Operational Certificate No. 3132 (the OC). This report provides groundwater monitoring results from spring (June) and fall (November) 2022 and expands upon the data set collected prior to the 2022 events. A summary of the spring 2022 results was submitted in August 2022

1.1 SITE DESCRIPTION

The Landfill has been operational since the 1970s and is in a former Ministry of Transportation and Infrastructure gravel pit, located approximately 2.4 kilometres (km) northeast of the Quesnel city centre along Carson Pit Road, as shown on Figure 1, Appendix A. The active Landfill occupies an area of approximately 13.5 hectares and is situated on the northern portion of Block E of District Lot 6683, Cariboo District. The inactive historic landfill area, formerly used as a park with baseball diamonds, is located immediately south of the active Landfill and has recently been used for a recycling depot and stockpiling excess soil.

Various land uses (i.e. industrial, commercial, residential) are located immediately north, south, and west of the Landfill. The area north and west of the Landfill is primarily occupied by Cariboo Pulp & Paper Co. (CPP), which has its own network of groundwater monitoring wells and maintains an annual groundwater monitoring program. Historically, an informal agreement regarding the sharing of the groundwater dataset has been in place between CPP and the City. A concrete manufacturing plant, United Concrete & Gravel, is located immediately west of the Landfill and immediately east and south of the CPP property. A residence located at United Concrete & Gravel is located immediately southwest of the Landfill. Surrounding land use near the Landfill is shown on Figure 2.

1.2 PERMIT INFORMATION

Operations of the Landfill are regulated under Operational Certificate No. 3132 (the OC) issued by BC ENV under the provisions of the Environmental Management Act for the discharge of refuse to land. The OC was initially issued in February 1974 (as a Permit) with the most recent amendment made in July 2021. In accordance with the OC, the City is required to maintain a monitoring plan that contains a Quality Assurance Manual consistent with the document entitled British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment and Biological Samples (2003 Edition).

The most recent amendment to the OC was made in July 2021 which included updates to Section 3, Landfill Gas Management, and Section 5.3, Soil Gas Monitoring, following the issuance of the Quesnel Landfill Gas Migration Risk Assessment report dated 31 May 2021 by Sperling Hansen Associates (SHA). Section 5.3 states that “Soil gas monitoring shall be as specified in the Qualified Professional report from Section 3, submitted and implemented by May 31, 2021 and with the following minimum to be included.” The table included has the list of all soil vapour probes which are to be monitored bi-annually for methane.

A copy of the OC is provided in Appendix B.

2 BACKGROUND

2.1 CONTAMINANT HYDROGEOLOGY CONCEPTUAL MODEL

A conceptual model was originally developed for the site in 2010 based on subsurface data collected up until 2009 and was presented in the report entitled, 2009 Annual Groundwater Monitoring Report, Quesnel Sanitary Landfill, Quesnel, BC, KX05102, dated 10 June 2010.

The Landfill is situated at the northeast corner of a river meander as shown in Figure 1. There is a shallow perched aquifer beneath the Landfill that is located atop a thick and laterally extensive clay layer that extends approximately 1 km to the west and 150 metres (m) north of the Landfill. It is considered that this clay layer acts as an aquitard that has created the perched water table. Further west of the Landfill, the clay layer is absent. There is an unsaturated zone below the clay aquitard and the regional water table is encountered at an elevation of approximately 475 m (consistent with the elevation of the Quesnel River). The elevation of the groundwater surface in the shallow perched aquifer beneath the Landfill is approximately 530 m. The vertical separation from the base of the clay aquitard at MW08-8D to the water table in the regional aquifer is approximately 26 m, and at MW11-13D the separation is approximately 28 m.

Figures 5 and 6 are cross-sections that show the perched aquifer and regional aquifer. These two aquifers are not directly connected as shown by the significant difference in the groundwater elevation of the perched aquifer and the regional aquifer (i.e., approximately 55 m difference), and the approximately 27 m thick unsaturated zone below the clay aquitard. The presence of the unsaturated zone beneath the clay aquitard defines the shallow aquifer as being perched. Both the shallow and regional aquifers are unconfined which means that there is an unsaturated zone above each water table. Water from the shallow aquifer can infiltrate down to the regional aquifer where the clay aquitard is not present, but water level changes in the regional aquifer do not affect water levels in the perched aquifer. The Quesnel River is hydraulically connected to the regional aquifer, and changes in the river level affect the groundwater elevation in the regional aquifer. Previous investigations by Interior Water Wells Ltd. working with Pacific Hydrology Consultants Ltd. in 1992 have confirmed that the regional aquifer is highly productive. It is known to be used as a process water source by both CPP and United Concrete & Gravel.

Based on the physical and chemical hydrogeological data, groundwater in the shallow perched aquifer beneath the Landfill flows toward the north and northwest of the Landfill, and this water cascades down to the regional aquifer. The topography of the clay aquitard controls groundwater flow in the perched aquifer.

No clay layer was reported at MW05-10 (known as WL14 in the CPP nomenclature). This well is screened in the regional aquifer north of the Landfill at the toe of the slope. The groundwater at this location is impacted with landfill leachate (e.g. chloride) and differs from groundwater quality at locations nearer the Landfill in that nitrate (NO_3^-) is detected at relatively high concentrations instead of ammonia (NH_4^+). Elevated ammonia concentrations in the perched aquifer near the Landfill are inferred to be due to biodegradation of organics in landfilled waste. Nitrate and selenium exceed the CSR standards at MW05-10 and the presence of these contaminants appears to be related to oxidation of landfill leachate as groundwater cascades from the perched aquifer to the regional aquifer.

The combination of the perched aquifer, the oxidation of groundwater from the perched aquifer as it cascades downward to the regional aquifer and the composition of the landfill leachate combine to make what is essentially an aerobic bioreactor to oxidize the landfill leachate. This process effectively removes a variety of contaminants derived from the Landfill including excess alkalinity, chemical oxygen demand (COD) and ammonia. However, based on data in the regional aquifer collected on behalf of the City and CPP, it appears that this process is mobilizing selenium in the regional aquifer. It is hypothesized that the selenium is derived from the soil and is released by biogeochemical reactions that are oxidizing the landfill leachate as it cascades downward toward the regional aquifer.

Due to the physical setting of the cascade, the groundwater infiltrating through the unsaturated sands above the regional aquifer will have a very high surface area exposed to the soil gas. This will allow very efficient mass transfer of gases (oxygen, nitrogen, methane, carbon dioxide) into and out of the groundwater.

2.1.1 SUMMARY OF BIOGEOCHEMISTRY INTERPRETATION

As discussed in previous annual reports, leachate and/or landfill gas impacted groundwater in the perched aquifer infiltrates through a 27 m thick unsaturated zone to the regional aquifer at an estimated rate of 350 m^3/day.

As methane (in the landfill gas) and ammonia (from the groundwater) are oxidized near the cascade, significant volumes of oxygen will be consumed, and nitrogen and carbon dioxide will be released. Oxygen and methane are consumed more quickly than nitrogen and/or carbon dioxide are produced, and there will be a net negative gas pressure induced near the cascade. The pressure and chemical gradients in the soil gas are affected by biological activity that is oxidizing landfill leachate.

2.2 MONITORING WELL NETWORK

The current monitoring well network at the Landfill is as shown on Figure 3. A total of four groundwater monitoring wells were completed in 1989 by WSP (formerly Hardy BBT Limited). These monitoring locations were identified as OW-1, OW2, OW-3, and OW-4. In 1992, Stanley Associates Engineering Limited installed monitoring locations OW-5S and OW-5D and a deeper monitoring well, OW-3D, at the location of OW-3. In 1996, the groundwater monitoring network was reassessed by AGRA Earth & Environmental (now WSP) and three additional monitoring locations (OW 5A, OW-6 and OW-7) were installed.

Completion details for two monitoring wells installed within the Landfill footprint (OW-5S and OW 5D), are not available. Similarly, there is no information regarding the decommissioning of these wells (i.e., if they were sealed to surface with grout, concrete, or bentonite). It is assumed that the monitoring wells were destroyed during day-to-day landfill operations. Therefore, without confirmation of proper decommissioning details, these wells may create a preferential flow path if they were completed through the clay aquitard. Wells OW-5A and OW-7 were installed as replacements for monitoring locations OW-5S which has been assumed to be destroyed and OW-2 which had insufficient water for monitoring. Monitoring well OW-6 was installed in the northwest corner of the Landfill to supplement the existing groundwater monitoring network.

Based on the historic groundwater monitoring data set, monitoring well OW-2 was considered dry as the bottom of the well screen was above the water table. Since 1996, no groundwater sample has been collected from monitoring well OW-2 but groundwater elevation data was recorded until approximately 1998 when the monitoring well was destroyed during Landfill upgrading activities. Information on the destruction of the

monitoring well OW-2 is also not available and there is no information regarding the decommissioning, if any, of these wells (i.e., pursuant to the BC Groundwater Protection Regulation (GPR)).

Monitoring well OW-3 was consistently dry until approximately 1989. This well was monitored until 1998 when it was destroyed during Landfill activities.

In 2005, three monitoring wells identified as MW05-8S, MW05-8D, and MW05-9 were installed down gradient of the Landfill. MW05-8D was dry and has since been replaced by MW08-8D. MW05-9 and MW05-8S were installed in the shallow perched aquifer to a depth of 15 m and 18 m below ground surface (bgs), respectively.

A CPP-owned monitoring location identified as MW05-10 (or WL14 according to CPP nomenclature) was also incorporated into the monitoring network at this time. This monitoring location is installed 150 m north of the Landfill on the CPP property in the regional aquifer.

In 2007, two monitoring wells identified as MW07-11 and MW07-12 were installed 450 m south of the Landfill. These groundwater monitoring wells were intended to provide background groundwater quality data for the shallow aquifer. However, the clay aquitard is shallower at these locations and the shallow perched aquifer does not extend this far south. Monitoring location MW07-11 has been dry since it was installed and monitoring location MW07-12 yields water during spring freshet and intermittently yields sufficient water in the fall.

In 2008, MW05-8D was decommissioned in accordance with the GPR and replaced by MW08-8D located 1 m northwest of where MW05-8D had been installed.

In 2011, three monitoring wells were installed: MW11-13S, MW11-13D, and MW11-14. MW11-13S was installed in the shallow perched aquifer to a depth of 12 m bgs, while MW11 13D was installed in a separate borehole (within 1 m radius of MW11-13S) in the deep regional aquifer to a depth of 64 m bgs. Monitoring well MW11-14 was installed into the shallow perched aquifer to a depth of 10 m bgs.

In October 2013, MW05-9 located adjacent to a mobile home west of the Landfill could not be found and was considered to have been destroyed during the removal of the mobile home and expansion of United Concrete & Gravel's gravel pit into this area. The decommissioning completed on this well, if any, is not known.

On 29 and 30 July 2014, monitoring well OW-5A was decommissioned in accordance with the GPR. The well had been damaged beyond repair prior to the October 2013 monitoring event. A well closure report was included in the 2014 annual report.

In June 2022, monitoring well OW-6 was extended to accommodate the construction of a toe berm for expansion of the Landfill. The City hired a well drilling company to raise the metal casing protector and PVC well casing to keep the monitoring well in service. The monitoring well was resurveyed and the new elevation has been updated in WSP's records. Monitoring well OW-6 was sampled during the spring prior to modifications and in the fall after modifications were complete. Photographs are included in Appendix C for reference.

All available borehole logs for the monitoring wells installed at the Landfill are included in Appendix D.

2.3 POTABLE WATER WELLS AND SURFACE WATER

Potable water wells servicing adjacent properties have been included in the groundwater monitoring program. These potable wells service a former outdoor recreational facility and soccer field (SF) which is currently being re-developed into a public works facility for the City, and United Concrete & Gravel (CP). The locations of the potable water wells are included on Figure 3.

Historically a potable water sample was collected from a SPCA animal shelter (SPCA) located approximately 400 m south of the Landfill. However, in 2012 the City stated that the potable water supplying the SPCA and the soccer field (SF) were connected to the same well since approximately 2005. As a result, the SPCA location was removed from the sampling program beginning in the fall of 2012. Around 2017, new municipal water infrastructure was installed to the SPCA, the Landfill and to the new public works facility. During the 2016 Annual Groundwater Monitoring Program, the SF well had been shut off due to the potential rezoning of the property. During the spring and fall since 2016, the City has been contacted to turn on the SF well during our sampling events. During the spring 2020 sampling event, the soccer field property was being redeveloped into a public works facility for the City. The well was turned on in 2020 to provide washroom facilities during the redevelopment works and has since been turned off after completion of the public works facility in 2021. The well is only turned on for the sampling events and WSP will continue to monitor this potable well until the SF well is decommissioned.

Historically a potable water sample was collected from the private residence (DW-4) located at United Concrete & Gravel located approximately 200 m southwest of the Landfill. In 2012, it was suggested by the plant manager that the well is installed in the shallow perched aquifer. In spring 2021, inquires with the current tenants state that the well has been shut off and the DW-4 residences are being supplied by United Concrete & Gravel (CP well), as confirmed through analytical results.

Table 2-1 summarizes information regarding each potable water well that is currently included (or has been historically included) in the Landfill groundwater monitoring program.

Table 2-1: Potable Water Well Summary

SAMPLE LOCATION	RELATIVE WELL LOCATION	SUPPLY AREA	COMMENTS
DW-1A	West of Landfill entrance	Former residence located on the lot	Had been included in the routine monitoring program since 2001. The residence was a mobile home and was removed in 2010. Details regarding decommissioning of this well are not known.
DW-1	West of Landfill entrance	N/A	Abandoned in 1995. Details regarding the decommissioning of this well are not known.
DW-4	Southwest of Landfill entrance	Potable water source for the residence at 1421 Sword Avenue (adjacent to United Concrete & Gravel)	Has been part of the routine monitoring program since 1995. The owner of the residence also owns United Concrete & Gravel adjacent to the west. In 2012, it was suggested by the plant manager that the well is installed in the shallow perched aquifer. In spring 2021, inquires with the current tenants state that the well has been shut off and the DW-4 residences are being supplied by United Concrete & Gravel (CP well), as confirmed through analytical results.

SAMPLE LOCATION	RELATIVE WELL LOCATION	SUPPLY AREA	COMMENTS
United Concrete & Gravel - Concrete Plant (CP)	Southwest of the Landfill	Potable water and process water source for the concrete manufacturing plant.	Has been part of the routine monitoring program since 1994. Has been supplying water to residences of DW-4 since spring 2021.
Soccer Field (SF)	Southwest of Landfill entrance	Potable water source for the inactive concession stand and bathrooms.	Has been included in the routine monitoring efforts since 2001. SF hasn't been used since 2016 and has only been turned on for sampling events. In 2020, the SF well was used to provide washroom facilities during the redevelopment works.
SPCA	South of Landfill (on School Board property)	Potable water source for the SPCA, a residence, Girl Guides.	Was included in the program from 2001 to 2012. Known to be from the same well as the Soccer Field.

A natural seep located northwest of the Landfill between MW05-9 and MW05-8S/MW08-8D was included in the monitoring network starting in 2001. It was removed from the 2010 monitoring program, as it was not expected to be representative of the perched aquifer water quality upon exposure of the water to atmospheric oxygen.

In September 2015, WSP became aware of a dug well that is approximately 3 m below ground surface (m bgs) at 821 Carson Pit Road in the former gravel pit occupied by Pacesetter Mills Ltd. (PM) and close to the natural seep. Pacesetter Mills (PM) installed the well in 2013 and uses it as a non-potable water source for washing equipment, etc. Water from this well was initially sampled during October 2015 in place of the natural seep and has since been added to the network of routine sampling locations for the Landfill.

All available well logs included in the monitoring network are included in Appendix D.

2.4 SOIL VAPOUR PROBES

In 2012, WSP installed ten shallow soil vapour probes (SVPs) at the Landfill. The SVPs are labelled SVP12 A through J and were installed to depths ranging from 1 m to 1.5 m bgs. The shallow SVPs were installed to allow for monitoring of gas concentrations (oxygen, methane and carbon dioxide) in the shallow soils near, and at, the Landfill. The ten SVPs were installed along the north, west and south edges of the Landfill, as well as outside the Landfill footprint. Since installation, eight SVPs have been destroyed for various reasons (i.e., development of the scale shack, equipment damage) which leaves two functioning SVPs. The SVP locations are shown on Figure 4.

Between 28 September to 1 October 2020 Sperling Hansen Associates Inc. (SHA) installed twelve landfill gas (LFG) probes along the west side of the Landfill. The wells were installed by Geotech Drilling and supervised by a SHA representative. Following installation SHA sampled all the LFG probes using a GEM 2000. The SHA LFG Probe design and install memo was included in the 2020 annual report. The LFG probe locations are shown on Figure 4 and have now been included in the spring and fall monitoring events as required by the OC. When combined with the two remaining SVP locations, there are now 14 soil gas monitoring locations as shown on Figure 4.

3 FIELD SAMPLING METHODS

On June 15-17, November 2 and 3, 2022, WSP personnel visited the Landfill and collected water level data using a Heron dipper-T water level tape. At the same time soil gas concentrations were monitored at all available wells using a calibrated GEM 5000 Landfill Gas meter in the spring (serial number: G504612) and in the fall (serial number: G504612). Monitoring well MW07-11 was found to be dry during both events as is consistent with previous events. Monitoring well MW07-12 was found to be dry during the fall monitoring event.

WSP collected representative groundwater samples from the available monitoring locations in the spring and fall of 2022. The monitoring wells were purged and sampled with either disposable plastic bailers or a Hydrolift pump with dedicated high density polyethylene (HDPE) tubing and foot valve. Approximately three well volumes of groundwater were removed from each monitoring well during the purging procedure. Groundwater was removed until field measurements of pH, electrical conductivity (EC), and temperature were stabilized, indicating the groundwater collected was fresh from the formation. The field parameters were recorded with a calibrated hand-held meter (for the spring, YSI 556 serial number: 13J100672 and for the fall, YSI Professional Plus serial number: 21C103685). Samples obtained from the monitoring wells for dissolved metals analysis were field-filtered using a 0.45 micron disposable filter and preserved with nitric acid. Samples collected for dissolved mercury analysis were field-filtered and preserved with hydrochloric acid. Samples collected for ammonia, Chemical Oxygen Demand (COD), and Total Organic Carbon (TOC) analysis were preserved with sulphuric acid.

Pacesetter Mills (PM) sample was obtained via a bailer and was not purged prior to sampling. The total metals sample was not filtered and was preserved with nitric acid.

Water from the Soccer Field (SF) and Concrete Plant (CP) was sampled from the respective tap sources after being purged for approximately ten minutes or until field parameters were stabilized. Samples obtained from the potable taps for total metals analyses were not filtered and were preserved with nitric acid.

All water samples were placed into laboratory supplied sample bottles and appropriately preserved, where required. Upon collection, the samples were stored in ice-packed coolers and sent by courier to the ALS Environmental Laboratory (ALS) in Burnaby, BC, which is accredited by the Canadian Association for Laboratory Accreditation (CALA) for the analyses completed. Chain-of-custody protocol was observed during the handling and transport of the groundwater samples.

Table 3-1 summarizes the laboratory analyses for each monitoring location.

Table 3-1: Summary of Analytical Parameters Sampled in 2022

WELL ID	GENERAL CHEMISTRY	TOTAL SULPHUR	AMMONIA	LEPH/HEPH/PAH	BTEX/VPH	TOC/TIC	COD	METALS
OW-1	X	X	X	X	--	X	X	D
OW-6	X	X	X	X	--	X	X	D
OW-7	X	X	X	--	--	X	X	D
MW05-8S	X	X	X	X	--	X	X	D
MW08-8D	X	X	X	--	--	X	X	D
MW05-10	X	X	X	--	--	X	X	D
MW07-12	X	X	X	--	--	X	X	D
MW11-13S	X	X	X	--	--	X	X	D
MW11-13D	X	X	X	--	--	X	X	D
MW11-14	X	X	X	--	X	X	X	D
CP	X	X	X	--	--	X	X	T
SF	X	X	X	--	--	X	X	T
PM	X	X	X	--	--	X	X	T

Table Note:

LEPH	light extractable petroleum hydrocarbon	COD	chemical oxygen demand
HEPH	heavy extractable petroleum hydrocarbon	D	denotes dissolved metals sample
PAH	polycyclic aromatic hydrocarbon	T	denotes total metals sample
BTEX	benzene, toluene, ethylene, xylene	CP	denotes Cement Plant (United Concrete & Gravel)
VPH	volatile petroleum hydrocarbon	SF	denotes Soccer Fields
TOC	total organic carbons	PM	denotes Pacesetter Mills dug well
TIC	total inorganic carbons	--	denotes sample not analyzed for parameter

In June and November, one blind field duplicate sample was collected from OW-1 and submitted for analysis of general chemistry, ammonia, TIC, TOC, COD, dissolved metals and light and heavy extractable petroleum hydrocarbons (LEPH, HEPH), and polycyclic aromatic hydrocarbons (PAHs). A second blind field duplicate sample was collected from MW11-14 and was submitted for analysis of benzene, toluene, ethylbenzene and xylenes (BTEX), and volatile petroleum hydrocarbons (VPH).

4 RESULTS AND DISCUSSION

4.1 GROUNDWATER FLOW

The monitoring well construction details and water level monitoring data are summarized on Table 1 in Appendix E. The groundwater elevation data from November 2022 is presented on Figure 3; for the June groundwater elevation data refer to the Spring Interim report. Hydrographs for the perched and regional aquifers are presented in Appendix F.

The elevations of the top of the clay aquitard as encountered at the monitoring well locations are summarized in Table 4-1 as metres above sea level (m ASL). Groundwater elevations from May 2011 are used in Table 4-1 to determine the saturated thickness at each monitoring well, and the thicknesses in 2022 are similar.

Table 4-1: Clay Aquitard Elevation and Saturated Thickness at Monitoring Well Locations

WELL ID	TOP OF CASING ELEVATION (m ASL)	CLAY DEPTH (m)		CLAY ELEVATION (m)		GROUNDWATER ELEVATION (m ASL)	SATURATED THICKNESS (m)
		Top	Bottom	Top	Bottom	May 2011	
Monitoring Wells Completed in Perched Aquifer							Above Clay Aquitard
MW05-8S	534.98	21.9	-	513.1	503.1	519.38	6.3
OW-6	530.84[1]	19.8	-	511.0	-	522.37	11.4
MW05-9	534.26	-	-	-	-	522.63	4.1
OW-7	534.00	25	-	509.0	-	522.39	13.4
OW-1	533.95	22.6	-	511.4	-	522.99	11.6
OW-5A	542.54	17.2	-	525.3	-	528.34	3.0
Monitoring Wells Completed in Perched Aquifer with Clay Aquitard Above Water Level							Below Clay Aquitard
MW11-13S	533.79	10.4	-	523.8	-	Dry at 522.19	-1.6
MW11-14	534.12	8.9	-	525.0	-	524.92	-0.1
MW07-11	546.96	3.1	-	543.8	-	543.40	-0.4
MW07-12	546.32	2.9	-	543.4	-	544.33	-0.1
Monitoring Wells Completed in Regional Aquifer							Bottom of Aquitard to Regional Water Table
MW11-13D	534.04	12.2	32.0	522.0	502.0	475.19	26.8
MW08-8D	535.06	22.0	32.0	513.1	503.1	475.34	27.8

Table Note:
m ASL meters above sea level
1 New casing elevation of 537.98 m ASL as of June 2022 due to construction of the toe berm

The Landfill is underlain by a shallow perched sand and gravel aquifer that sits atop a laterally extensive and thick clay layer which forms an aquitard. Based upon the elevation information included in Table 4-1, there is a distinct bowl shape to the upper surface of the clay aquitard with groundwater flow from the Landfill directed to the northwest toward MW05-8S. Destroyed monitoring wells OW-5A, MW05-9; and current monitoring wells OW-1,

OW-6, OW-7, MW05-8S, MW07-11, MW07-12, MW11-13S and MW11-14 are all completed in this perched aquifer.

Figure 3 shows the groundwater elevations observed in November 2022, and the groundwater elevations in the perched aquifer have been contoured. The interpretation of the groundwater elevation data is partially based on historic groundwater elevations at locations that were unavailable in 2022, including OW-5A and MW05-9. The groundwater elevations for the upper aquifer have been contoured based on the monitoring well data, and the inferred elevation of the base of the perched aquifer (i.e., the elevation of the upper surface of the clay aquitard). The elevation of the upper surface of the clay aquitard near the edge of the upper bench is inferred to be 513 m, and the final groundwater elevation contour presented on Figure 3 is 519 m which implies a six-metre-thick saturated zone in the perched aquifer along this contour line. The gradient of 0.02 m/m to 0.05 m/m is relatively steep for a sand aquifer and this reflects the bowl shape of the clay aquitard.

In the 2011 annual report, the groundwater flux discharging from the perched aquifer to the regional aquifer was estimated using a flow net. The calculated groundwater flux of 350 m^3/day is a reasonable estimate based on a hydraulic conductivity of 10^{-4} m/s. The main source of uncertainty in this flux estimate is the hydraulic conductivity of the perched aquifer, and this also applies to the calculation of average groundwater flow velocities. With gradients in the perched aquifer of 0.02 m/m to 0.05 m/m, which are relatively steep for a sand aquifer, the calculated groundwater flow velocity ranges from 300 to 500 m/year. These groundwater flow velocities are fast as typical groundwater flow velocities in sand aquifers under typical gradients are approximately 0.3 m/day, or 100 m/year.

4.2 SOIL VAPOUR MONITORING

Soil vapour at landfills is primarily biogenic gas composed of methane (CH_4) and carbon dioxide (CO_2) created by methanogenic microbes which ferment organic matter to produce a 50:50 ratio of CH_4 and CO_2 (once established). The CO_2 produced is soluble in groundwater, and it is common to measure 60% CH_4 and 40% CO_2 in soil gas within a landfill. This is commonly known as ‘landfill gas’. Methane is considered explosive between the lower explosive limit (LEL) of 5% CH_4 by volume, at 20 degrees Celsius, and the upper explosive limit (UEL) of 15% of CH_4 by volume when in the presence of atmospheric oxygen.

Field vapour monitoring events in 2022 consisted of measuring vapour readings in the monitoring well headspace or soil vapour probes (SVP) and LFG probes (installed in fall 2020 by SHA) with a calibrated GEM 5000 Landfill Gas Analyzer. The field vapour readings recorded were for peak and stabilized (usually after 90 seconds). SVP12-B and SVP12-J had appeared to be destroyed before June 2022 and as such were not monitored in 2022. In November 2022, SVP12-C was found to be protected by a cone; however, the cone was buried with soil from the toe berm construction. Discussions with the City were conducted and in 2023 work will be budgeted to dig out and extend the SVP to keep this SVP in service. MW05-10 was not monitored in November 2022 due to limited access to CPP’s property and was sampled in October 2022; however, no GEM was available for the October field date.

The vapour readings are presented in appended Table 2, and the notable 2022 readings are summarized in Table 4-2 below. The methane concentration data collected by WSP for November is presented on Figure 4.

Table 4-2: Notable 2022 Soil Vapour Monitoring Results

WELL ID/SVP ID	LOCATION	CH4 %		CO2 %	
		June	November	June	November
OW-1	PB	***44.4***	**11.6**	32.1	7.8
OW-7	PB	**13**	**5.8**	13.1	5.7
SVP12-C	FP	***56.8***	-	36.2	-
BH20-A	PB	***34.9***	4.5	27.4	4.1
BH20-B	PB	***32.5***	**6.3**	25.6	4.9
BH20-C(s)	PB	***28.6***	**9.8**	27.5	8.2
BH20-C(d)	PB	***24.5***	**6.1**	23.3	7.3
BH20-D	PB	***22.6***	**7.1**	29.1	6.7
BH20-E	PB	***45.6***	**14.8**	46.2	6.6
BH20-F(s)	PB	***46.2***	**6.6**	34.3	6.7
BH20-F(d)	PB	***52.7***	**11.9**	37	8.5
BH20-G(s)	PB	***48***	**7.4**	35.3	5.6
BH20-G(d)	PB	***32.9***	**5.7**	24.3	4.9
BH20-H	PB	***28.9***	3.2	24	3.3

Table Note:
Bolded CH_4 results indicate concentrations above the LEL of 5 % gas
Italicized CH_4 results indicate concentrations above the UEL of 15 % gas
PB located near property boundary
FP within the landfill footprint
"-" Reading not obtained due to access issues

Concentrations of CH_4 and CO_2 at all monitoring location decreased in the fall monitoring event compared to the spring monitoring event. Soil gas concentrations can be affected by changes in biological activity related to temperature and soil moisture content.

Monitoring well OW-1, soil vapour probe SVP12-C, and LFG probes BH20-A through BH20-H continue to have concentrations of CH_4 that exceeded the UEL in spring 2022. Monitoring wells with methane concentrations above the UEL (15% methane by volume) have a possibility of combustion, should conditions change (i.e., oxygen ingress) that bring the concentration of methane to between the LEL and UEL which is the flammable range.

A guidance document entitled "Landfill Criteria for Municipal Solid Waste" (the Landfill Criteria), published by BC ENV in June 2016 was developed to guide the siting, design, operation, closure and monitoring of landfills that accept municipal solid waste (MSW). Section 4.2 of the Landfill Criteria states that:

> "*Soil gas concentrations at the landfill site boundary must not exceed the lower explosive limit of methane (5 percent by volume).*
>
> *Combustible gas concentrations measured in on-site buildings must not exceed 20 percent of the lower explosive limit of methane (1 percent by volume) at any time.*

Landfill Gas must also be managed in accordance with all migration and health and safety requirements. Resources include Worksafe BC and the Landfill Gas Management Facilities Design Guidelines (Section 8.0 LFG Migration Assessment and Control; Section 9.0 Health and Safety).

LFG emissions must be managed such that all federal, provincial, and local ambient air quality objectives and standards are not exceeded."

As per the amended OC, Section 3 is in line with Section 4.2 of the Landfill Criteria. Section 3 (e) of the amended OC states:

"Sampling for landfill gas, including but not limited to the following:

i. Periodic sampling at monitoring wells and gas sampling ports, with locations and frequency to be based on the recommendation of a Qualified Professional.

ii. Continuous combustible gas measurement in all buildings on the landfill property, as describe in Section 9.0 of the Landfill Gas Management Facilities Design Guidelines.

iii. Operation of portable continuous combustible gas measurement devices by all personnel working on the active face."

According to Section 4.2 of the Landfill Criteria, soil gas concentrations at the Landfill site boundary must not exceed the LEL of methane (5 percent by volume). Historically, soil gas concentrations of methane were measured above the UEL at locations off the Landfill's property on adjacent land to the west. Additionally, OW1 and SVP12-C, which are both located on the Landfill near the property boundary had methane concentrations above the UEL in the spring monitoring event. Of the twelve LFG probes installed by SHA along the west edge of the Landfill property boundary, eleven (BH20-A, BH20-B, BH20-C(s), BH20-C(d), BH20-D, BH20-E, BH20F(s), BH20-F(d), BH20-G(s), BH20-G(d), and BH20-H) had concentrations of methane above the UEL in the spring monitoring event. Methane concentrations at these monitoring locations decreased in the fall monitoring event, however, only two locations (BH20-A and BH20-H) had concentrations of methane below the LEL in the fall.

Previously in fall 2020, concentrations of methane at BH20-I were above the LEL at a concentration of 7.5% CH_4. Methane at BH20-I during 2021 and 2022 was nearly non-detectable at 0% and 0.4% CH_4.

WSP has recommended that additional monitoring of landfill gas be conducted within and near nearby buildings since 2013. The monitoring events (past and present) include ambient air readings measured at the following locations:

- inside the operators building adjacent to the weigh scale (scale house);
- beneath the operators building, accessed through a vent (beneath scale house);
- inside the 're-use' building at 980 Carson Pit Road (re-use (swap); and
- inside the recycling processing dome building (recycle dome).

As shown on Table 2 appended, the vapour readings taken in 2022 within these buildings are considered low and have been historically low. As noted above, when methane concentrations reach 20% of the LEL (1% methane gas by volume) in facility structures the conditions are considered hazardous. On-going monitoring is required to assess the potential for methane intrusion, or accumulation, within buildings near the Landfill. The City installed methane detectors in the scale house and the re-use building in 2020 to ensure that the potential accumulation of

dangerous landfill gases would not go unnoticed within the onsite buildings. The City also stated that the landfill compactor operator is fitted with a 4-gas sensor monitor at all times.

Section 3 (c) of the OC states that the "a perimeter gas migration control system for the west side of the landfill must be implemented by July 31, 2022." According to the City, the perimeter gas migration control system has not been implemented to date, but the City is currently in the cost estimate and planning stage. This perimeter gas migration control system is to reduce the migration of landfill gas off-Site and to reduce the potential for accumulation of methane within on-Site structures.

Hydrogen sulphide (H_2S) is monitored using the Gem 5000 for the well headspace vapours and soil vapour probes. In 2022, H_2S was detected at various wells and monitoring with both peak and stabilized values ranged from 1-3 ppm, and in previous years it has ranged as high as 41 ppm at OW-1. H_2S is a highly dangerous toxic gas that can cause health problems at low concentrations and is lethal at high concentrations. It is a by-product gas from organic material breakdown, such as the anaerobic oxidation of methane by sulphate reducing bacteria which is common in landfills. In BC, the occupational exposure limit (OEL) for gas phase H_2S is a Ceiling Limit (not to be exceeded) of 10 ppm. H_2S burns and explodes easily at concentrations in air from about 40,000 ppm to 460,000 ppm.

Soil gas concentrations should continue to be monitored to reduce the health and safety risks at the Landfill. This includes ensuring that the methane detectors within the onsite buildings remain operational with regular maintenance, calibration and a steady source of power.

4.3 GROUNDWATER ANALYTICAL RESULTS

4.3.1 BACKGROUND COMPARISON

Historically, monitoring well MW07-12 has been considered representative of the background groundwater quality of the shallow aquifer. However, the groundwater at this monitoring well appears to have been influenced by soil gas from the Landfill. This well was installed in 2007 after the Landfill had been operating for over 30 years.

A monitoring well is not available to evaluate the background water quality in the regional aquifer. Groundwater flow in the regional aquifer is controlled by the height of the Quesnel River and generally flows toward the southwest. The potable water wells that are known to be completed in the regional aquifer (SF and CP) have a consistency in water chemistry that suggests that these wells are currently unimpacted and are largely representative of the water quality in the regional aquifer. However, as these wells may be located downgradient of the cascade where the perched aquifer discharges into the regional aquifer, they may be impacted in future. Increased chloride concentrations are typically the first indication of landfill derived groundwater contamination.

4.3.2 COMPARISON TO BC CONTAMINATED SITES REGULATION (CSR) STANDARDS

A summary of water quality monitoring data relative to the regulatory standards for the 2022 monitoring event is presented in Tables 3 to 5 in Appendix E. Copies of the 2022 laboratory analytical reports are presented in Appendix G. Ion Percentage graphs summarizing the major ion chemistry are presented in Appendix H.

Exceedances of the BC CSR standards for the 2022 groundwater data are summarized in Table 4-3. The standards for Drinking Water quality (DW) and Aquatic Life (AW) are shown in the table.

WSP has an electronic copy of all the historical data for each of the wells since the annual sampling program began and can provide a copy upon request. The data set is too large to include in the annual report, but the historical major ion groundwater chemistry is shown on the Ion Percentage charts.

As shown in Table 4-3, most of the monitoring wells installed in the perched aquifer are showing groundwater quality indicative of landfill impacts (i.e., exceedances for chloride, ammonia, and various trace metals). The monitoring wells showing impacts of landfill leachate and/or landfill gas include OW-6, OW-1 and OW-7 along the west edge of the Landfill, and MW05-8S and MW11-14 located north of the Landfill. It should be noted that MW05-8S, MW11-14 and PM are outside the Landfill footprint. The groundwater in the shallow perched aquifer is flowing atop the clay aquitard to the north northwest as shown on Figure 3.

The deeper regional aquifer did not display the same groundwater quality as the perched aquifer, as summarized in Table 4-3. In this monitoring program for the City, the only monitoring well in the regional aquifer that exceeded the CSR standards was MW05-10. MW05-10 is located north of the Landfill on CPP's property and during the 2022 sampling had a concentration of selenium and nitrate that exceeded the CSR standards; this well has historically had elevated concentrations of selenium and nitrate. These results are interpreted to be indicative of landfill leachate impacts. MW05-10 is referred to as WL14 in the CPP nomenclature.

Table 4-3: Summary of 2022 Analytical Exceedances Compared to CSR Standards

PARAMETER	CSR DW	CSR AW	MONITORING WELL AND CONCENTRATIONS	
			June	November
Ammonia	ns	1.3-18.4 mg/L [pH]	OW-6 – 72.4 mg/L MW05-8S* - 57.2 mg/L MW11-14* – 131 mg/L	OW-6 – 70.1 mg/L MW05-8S* - 57.3 mg/L MW11-14* - 124 mg/L
Arsenic	0.01 mg/L	0.05 mg/L	OW-6 – 0.0275 mg/L MW05-8S* – 0.03 mg/L MW11-14* – 0.03 mg/L	OW-6 – 0.0284 mg/L MW05-8S* – 0.0208 mg/L MW11-14* – 0.0281 mg/L
Barium	1.0 mg/L	10.0 mg/L	OW-1 – 1.5 mg/L OW-6 – 1.01 mg/L MW05-8S* – 1.12 mg/L MW11-14* – 1.06 mg/L	OW-1 – 1.42 mg/L MW05-8S* – 1.13 mg/L MW11-14* – 1.08 mg/L
Chloride	250 mg/L	1500 mg/L	OW-1 – 401 mg/L OW-7 – 254 mg/L	OW-1 – 395 mg/L OW-7 – 354 mg/L
Cobalt	0.001 mg/L	0.04 mg/L	MW07-12* – 0.00202 mg/L OW-1 – 0.014 mg/L OW-6 – 0.00473 mg/L OW-7 – 0.00718 mg/L MW05-8S* – 0.00928 mg/L MW11-14* – 0.00602 mg/L [1]SF* - 0.00102 mg/L	OW-1 – 0.0143 mg/L OW-6 – 0.00453 mg/L OW-7 – 0.0121 mg/L MW05-8S* – 0.0101 mg/L MW11-14* – 0.00603 mg/L
Lead	0.01 mg/L	0.04-0.16 [H] mg/L	[1]SF* - 0.025.9 mg/L	-
Lithium	0.008 mg/L	ns	OW-6 – 0.0106 mg/L OW-7 – 0.009 mg/L MW05-8S* – 0.0108 mg/L MW11-14* – 0.0144 mg/L	OW-6 – 0.0103 mg/L OW-7 – 0.0098 mg/L MW05-8S* – 0.0107 mg/L MW11-14* – 0.0133 mg/L
Nickel	0.08 mg/L	1.5 mg/L [H]	OW-1 – 0.127 mg/L	OW-1 – 0.127 mg/L
Nitrate	10	400	-	MW05-10* - 23.6 mg/L
Selenium	0.01 mg/L	0.02 mg/L	MW05-10* - 0.014 mg/L	MW05-10* - 0.0658 mg/L
Sodium	200 mg/L	ns	OW-1 – 331 mg/L OW-6 – 208 mg/L MW11-14* – 253 mg/L	OW-1 – 331 mg/L MW11-14* – 269 mg/L
Strontium	2.5 mg/L	ns	OW-1 - 3.56 mg/L	OW-1 - 3.42 mg/L MW11-14* – 2.55 mg/L
Zinc	2.4 mg/L [H]	3 mg/L	[1]PM* - 3.21 mg/L	-

Table Note:
* denotes a monitoring well is located off-site
1 denotes total metals concentration
[pH] – indicates the standards are pH dependent
[H] – indicates the standards are hardness dependent
CSR DW Contaminated Sites Regulation Drinking Water Standards
CSR AW Contaminated Sites Regulation Aquatic Life Standards
ns no standard

The above results are consistent with the historic data set for the Site.

MW08-8D, which is screened in the regional aquifer near MW05-8S, did not have any exceedances of the various CSR standards. This suggests that the landfill leachate is not impacting the regional aquifer at this location. In accordance with the conceptual model for the Landfill, this location in the regional aquifer could be expected to show impacts due to impacted groundwater from the perched aquifer cascading down to the regional aquifer in the near future. However, the 2022 data did not show any exceedances of the CSR standards at this location.

The analytical results for the potable water supply wells completed in the regional aquifer to the west and south of the Landfill (i.e., SF and CP) do not indicate any impacts to the regional aquifer at these locations, with the exception of SF which had an elevated concentration of lead suspected to be due to decreased usage of the well. The elevated lead concentration observed in SF is consistent with the 2021 monitoring results.

Ion Percentage graphs are used to validate and interpret water chemistry at each monitoring location. Each monitoring location has an Ion Percentage graph generated and these are included in Appendix H.

4.3.3 COBALT CONCENTRATIONS

Cobalt concentrations are consistent with the historic data set for the Site. As of November 2017 with the Stage 10 (Omnibus) and Stage 11 Amendments to the CSR, the DW standard for cobalt was lowered to 0.001mg/L. The concentration of cobalt within MW07-12, located south and upgradient of the Site, was above the CSR DW standard. Therefore, concentrations of cobalt observed within the perched aquifer may be due to background concentrations. As per CSR Protocol 9 – Establishing Local Background Concentrations in Groundwater, there are no regional estimates for local background concentrations for the Quesnel region. However, as per footnote 2 of Table 1 in the Protocol, the interim cobalt value of 20 µg/L for remaining regions of the province remains in effect. Cobalt concentrations monitored in all wells were less than the interim cobalt value of 20 µg/L. Therefore, cobalt concentrations within the perched aquifer are interpreted to be representative of background concentrations.

4.3.4 WATER WELL PM

In September 2015, a dug well was noticed in the perched aquifer that is approximately 3 m below ground surface (m bgs) at 821 Carson Pit Road. This is in a former gravel pit occupied by Pacesetter Mills Ltd. (PM) and close to the natural seep that was historically included in the sampling program. Pacesetter Mills (PM) installed the well in 2013 and uses it as a non-potable water source for washing equipment, etc. Water from this well was initially sampled during October 2015 in place of the natural seep and has since been added to the network of routine sampling locations for the Landfill.

During the 2019 sampling program this location had exceedances that were likely attributed to the presence of increased sediment in the sample. The samples submitted for 2020 only had an exceedance of zinc in the spring and fall and the samples submitted for 2021 only had exceedances of cobalt and zinc in the spring.

Samples submitted for 2022 only had exceedances of zinc in the spring. WSP interprets the stability and persistence of the elevated zinc concentrations at this location to be possibly indicative of corrosion of the culvert material. Unlike stainless steel or PVC which are common well materials, the mild steel used for culverts would be more likely to corrode and this could be a point source of zinc.

The PM well is reportedly not used as a potable water supply.

4.3.5 SOCCER FIELD WELL SF

The soccer field well (SF) was turned on for the spring 2022 and fall 2022 sampling events, and the well has reportedly only been run during semi-annual groundwater sampling in the spring and fall. The analytical results for spring 2022 indicated an exceedance for cobalt and lead drinking water standards (1.02 µg/L versus the cobalt standard of 1 µg/L and 25.9 µg/L versus the lead standard of 10 µg/L for drinking water).

This is the first cobalt exceedance observed at this location. The cobalt concentration monitored in November event decreased to below detection method limit (<0.1 µg/L).

Lead concentrations in November 2022 decreased to a concentration of 1 ug/L. Historically, in 2018 to 2019 the lead concentrations were up to 8.86 ug/L in October 2019. In 2020, the concentrations reduced to 0.24 to 0.49 ug/L which was presumed to be due to continual use during construction activities at the new City public works facility. In spring 2021, the lead concentration increased to 22 µg/L, and it was the first lead exceedance observed at this location.

The elevated lead concentration appears to be correlated to the decreased water use and suggests that the lead is derived from the water pipes and not the groundwater itself. Furthermore, lead would likely not appear as the only groundwater contaminant if it was due to landfill leachate impacts. To avoid these elevated lead concentrations, water should be flushed through the system prior to first use for a given season.

4.3.6 QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance and quality control (QA/QC) procedures were implemented in the field and laboratory to demonstrate that the data generated was reliable and repeatable. Field QA/QC procedures included the use of new disposable sampling equipment where possible, and appropriate cleaning procedures for other sampling equipment. Samples were analyzed by ALS in Burnaby, BC, which is accredited by the CALA for the analyses completed.

Blind field duplicates were collected from OW-1 (general chemistry, metals, LEPH/HEPH, and PAH) and MW11-14 (BTEX and VPH) in both June and November 2022. Laboratory duplicate analyses, which are part of the CALA accreditation requirements for the analytical laboratory, were completed on OW-1, OW-7, and MW11-14 during the June analysis and MW05-08S, OW-6, and OW-1 during the November analysis for various parameters.

All groundwater quality data was reviewed and validated as part of the preparation of this report. The data validation procedure includes the calculation of electrical charge balance and an evaluation of inter-related parameters for consistency. This data validation is implemented through the use of Ion Percentage graphs as presented in Appendix H.

The 2022 monitoring data is presented on the Ion Percentage graphs. WSP completes data validation by evaluating historic trends in water chemistry and the calculation of electrical charge balance. Based on the reported concentrations, the amount of electrical charge missing was calculated by WSP and this is also presented on the Ion Percentage graphs. The missing charge is presented as “Missing as N” which quantifies the missing charge as nitrogen which can be present in water as cations, anions, or uncharged gases. In June 2022, ALS exceeded the recommended hold times for alkalinity, and based on historic trends, it appears that alkalinity was under-estimated resulting in elevated charge balance errors. In November 2022, several locations had elevated charge balance errors which again appear to be due to the reported values for alkalinity. Alkalinity is not regulated and these results do not change the overall data interpretation.

The field duplicate results are presented on Table 5. Duplicate results are evaluated using Relative Percent Difference (RPD) which is calculated as the difference in concentration divided by the average concentration. RPDs are not calculated when results are less than the Practical Quantitation Limit (PQL) which is defined as five times the Method Detection Limit (MDL). The PQL is applied because the error increases near the MDL.

The calculated RPD for all duplicate analyses are less than the QA Warning Limit applied of 20% with only two exceptions. For the duplicate sample collected from OW-1 in June 2022, the RPD for aluminum is 25.3 % and in November 2022 the RPD for pyrene is 40.6 %. The measured concentrations of these analytical parameters were below the regulatory standards, and this variability does not affect the data interpretation. The detection of titanium indicates the presence of sediment in the samples which is the source of the noted variability in the dissolved metal concentrations. Titanium is insoluble in water and the detection of titanium is indicative of sediment passing through the filter. The presence of sediment would also contribute to the duplicate variability for PAHs such as pyrene which have low water solubility and tend to adsorb to soil particles.

Based on the data validation applied, and with the exception of alkalinity, WSP considers the 2022 field and analytical data for the Site to be reliable and defensible.

5 CONCLUSIONS

WSP has completed the 2022 monitoring program at the City of Quesnel Municipal Landfill, and based on the data collected to date, the following conclusions are presented.

1. The 2022 results are consistent with the conceptual model of subsurface site conditions presented in previous annual reports.
2. Groundwater flow in the perched aquifer is controlled by the topography of the clay aquitard. Leachate and/or landfill gas impacted groundwater from the perched aquifer flows toward MW05-8S and subsequently cascades approximately 27 m through the unsaturated soils to the water table in the regional aquifer (i.e. near MW08-8D).
3. The groundwater in the perched aquifer near the Landfill is impacted with landfill leachate as shown by elevated concentrations of various parameters including chloride, ammonia, arsenic, barium, cobalt, lead, lithium, nickel, selenium, sodium, strontium, and zinc. Shallow groundwater in the perched aquifer is also inferred to be affected by the presence of landfill gas (primarily methane and carbon dioxide).
4. The CSR standards protective of freshwater Aquatic Life (AWf) and Drinking Water (DW) have been exceeded for several parameters in groundwater in the perched aquifer onsite and in offsite wells located north of the Landfill (OW-1, OW-6, OW-7, MW05-8S, MW05-10, and MW11-14).
5. The concentration of cobalt observed within the perched aquifer may be due to background concentrations, as the well MW07-12, located south and upgradient of the Site, had concentrations of cobalt exceeding the CSR DW standard. As per CSR Protocol 9 – Establishing Local Background Concentrations in Groundwater, there are no regional estimates for local background concentrations for the Quesnel region. However, as per footnote 2 of Table 1 in the Protocol, the interim cobalt value of 20 ug/L for remaining regions of the province remains in effect. Therefore, cobalt concentrations within the perched aquifer are interpreted to be representative of background concentrations.
6. The PM results for 2022 exceeded zinc in the spring. The 2019 results were interpreted to have been biased high due to the presence of sediment as indicated by detectable titanium in the water sample. The concentrations in 2020 exceeded for zinc, and concentrations in spring 2021 exceeded for zinc and cobalt. WSP interprets the stability and persistence of the elevated zinc concentrations at this location to be possibly indicative of corrosion of the culvert material. Unlike stainless steel or PVC which are common well materials, the mild steel used for culverts would be more likely to corrode and this could be a point source of zinc. The PM well is screened in the perched aquifer and is not used as a potable water source.
7. No exceedances of the BC CSR AW and DW standards were identified in the potable water source CP completed in the lower regional aquifer.
8. The SF well had exceedances for lead and cobalt during spring 2022. This is the first cobalt exceedance observed at this location. The elevated lead concentration appears historically in spring and is likely due to the decreased water use from this well. The lead is likely derived from the water pipes and not the groundwater itself. To avoid these elevated lead concentrations, water should be flushed through the system prior to first use for a given season.

9. Of the monitoring wells in the regional aquifer that are sampled for this project, no exceedances of the BC CSR AW and DW standards were identified with the exception of selenium at MW05-10 in the spring 2022. This well is located offsite 150 m north of the Landfill. The selenium in the regional aquifer appears to be mobilized from the soil during the oxidation of landfill impacted groundwater as it cascades from the perched aquifer down to the regional aquifer. This has also been noted in previous years.

10. Concentrations of methane measured in monitoring wells and soil vapour probes along the property boundary and at one offsite well and one offsite soil vapour probe were above the lower explosive limit (LEL) of methane, which contravenes the Landfill Criteria and represents a potentially hazardous condition. There exists a possibility of combustion, should an ignition source and oxygen be present, of any accumulated vapours with concentrations of methane above the LEL and below the upper explosive limit (UEL). The landfill gas migration control system, collection or management system, which is required by BC ENV, should be implemented as soon as possible to help reduce the landfill gas concentrations to mitigate the potentially hazardous conditions. At this time, the City is currently in non compliance with the OC. Either of these systems to be installed must be in accordance with the Landfill Criteria and OC. WSP understands that the City is planning to implement the system in 2023 and is currently in the cost estimation and planning stage.

11. H_2S is detectable in the soil gas at several monitoring locations. H_2S was measured in the gas phase at OW-1 at a concentration of 41 ppm in 2019, at 1 ppm in 2020, at 21 ppm in fall 2021, and at 1 ppm in fall 2022. H_2S is a highly dangerous toxic gas that can cause health problems at low concentrations and is lethal at high concentrations. It is a by-product gas from organic material breakdown, including the anaerobic oxidation of methane by sulphate reducing bacteria, which is common at landfills. In BC, the occupational exposure limit (OEL) for gas phase H_2S is a Ceiling Limit (not to be exceeded) of 10 ppm.

6 RECOMMENDATIONS

WSP has completed the 2022 groundwater monitoring program at the City of Quesnel Municipal Landfill, and based on the data collected to date, WSP recommends the following be carried into the 2023 groundwater monitoring program.

1. Continue routine semi-annual monitoring of the available groundwater monitoring wells and potable wells in 2023.
2. Continue to monitor landfill gases at vapour probes, on-site structures, and operations staff (i.e., personal gas monitor for methane, H_2S, and O_2) as per the OC.
3. Manage the landfill gas in accordance with all migration and health and safety requirements of the SHA Quesnel Landfill Gas Migration Risk Assessment report dated May 31, 2021. WSP was informed that the following recommendations have not been addressed:
    a. Installation of a ventilation system in the washroom facility. However, this washroom facility is not a public washroom anymore and access is limited;
    b. Placing covenants on adjacent properties; and
    c. Installation of a Landfill Gas System.
4. Implement the landfill gas migration control systems along the perimeter of the Landfill on the west side, as per the OC, as soon as possible.
5. Extend SVP12-C to maintain this soil vapour probe in working condition to monitor landfill gases.
6. Replace SVP12-B, which appears to have been damaged. This soil vapour probe location is included in the OC and is to be monitored bi-annually for methane.

7 CLOSURE

This report was prepared for the exclusive use of City of Quesnel and is intended to report on the groundwater conditions observed during the 2022 Groundwater Monitoring Program at the Quesnel Municipal Landfill in Quesnel, BC. This report is based on and limited by the interpretation of data, circumstances and conditions available at the time of completion of the work as referenced throughout the report. WSP does not accept any responsibility for the use of this report, in whole or in part, for any purpose other than that intended or to any third party for any use whatsoever.

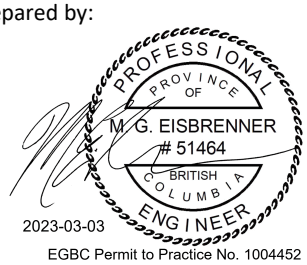
This report has been prepared for the exclusive use of the City of Quesnel for specific application to this project site. The work was conducted in accordance with the scope of work prepared for this project and generally accepted industry practices. No other warranty, expressed or implied, is made. Other limitations of this report are specified in the Terms and Conditions of the agreement between the City of Quesnel and WSP. The general limitations of this report are specified in the Statement of Limitations in Appendix I. Qualified Professionals Declarations are also included in Appendix I.

We trust that the information presented in this report meets your current requirements. If you have any questions regarding this report, please feel free to contact the undersigned.

Sincerely,

WSP E&I Canada Limited

Prepared by:



EGBC Permit to Practice No. 1004452

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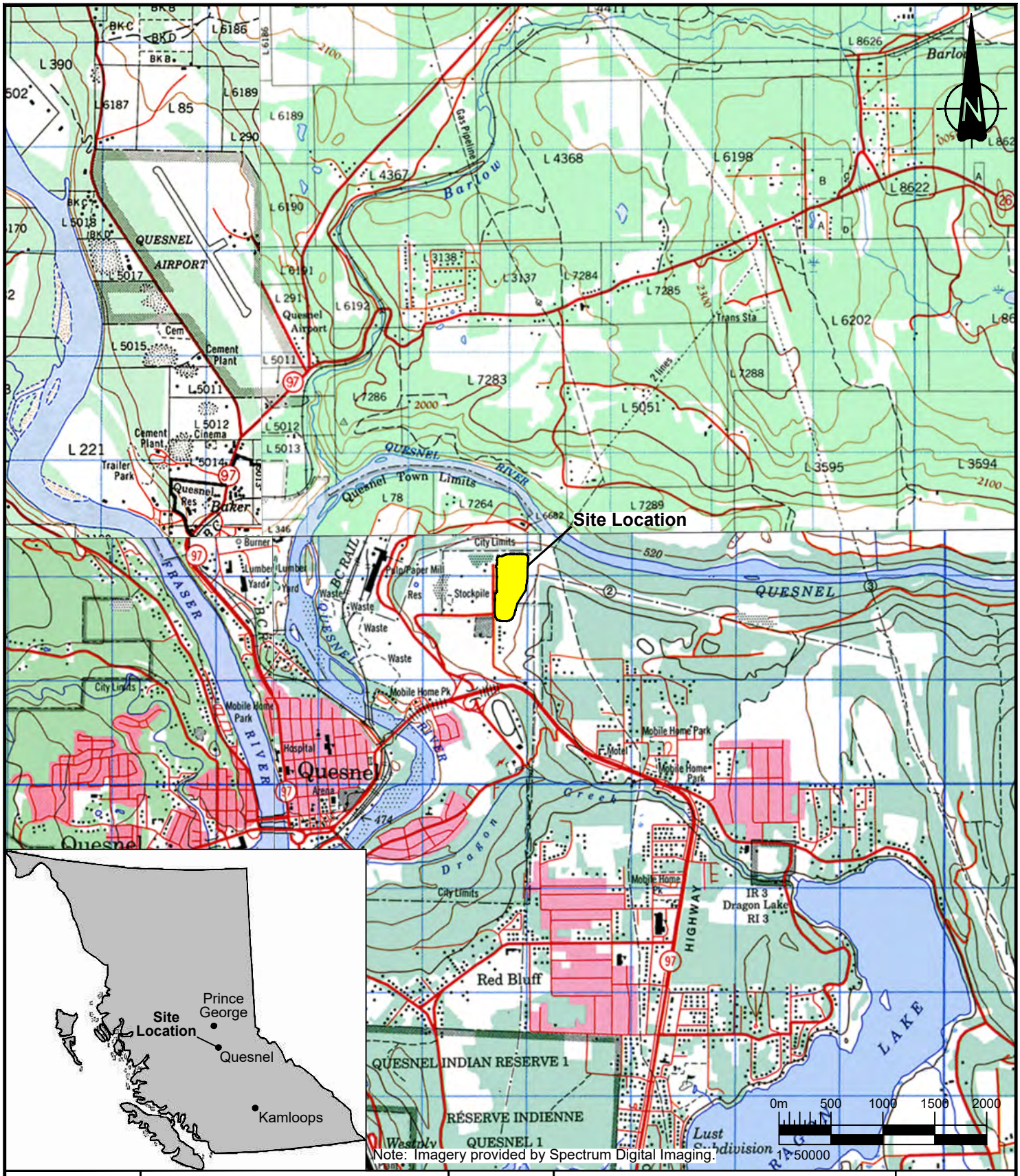
Appendix A

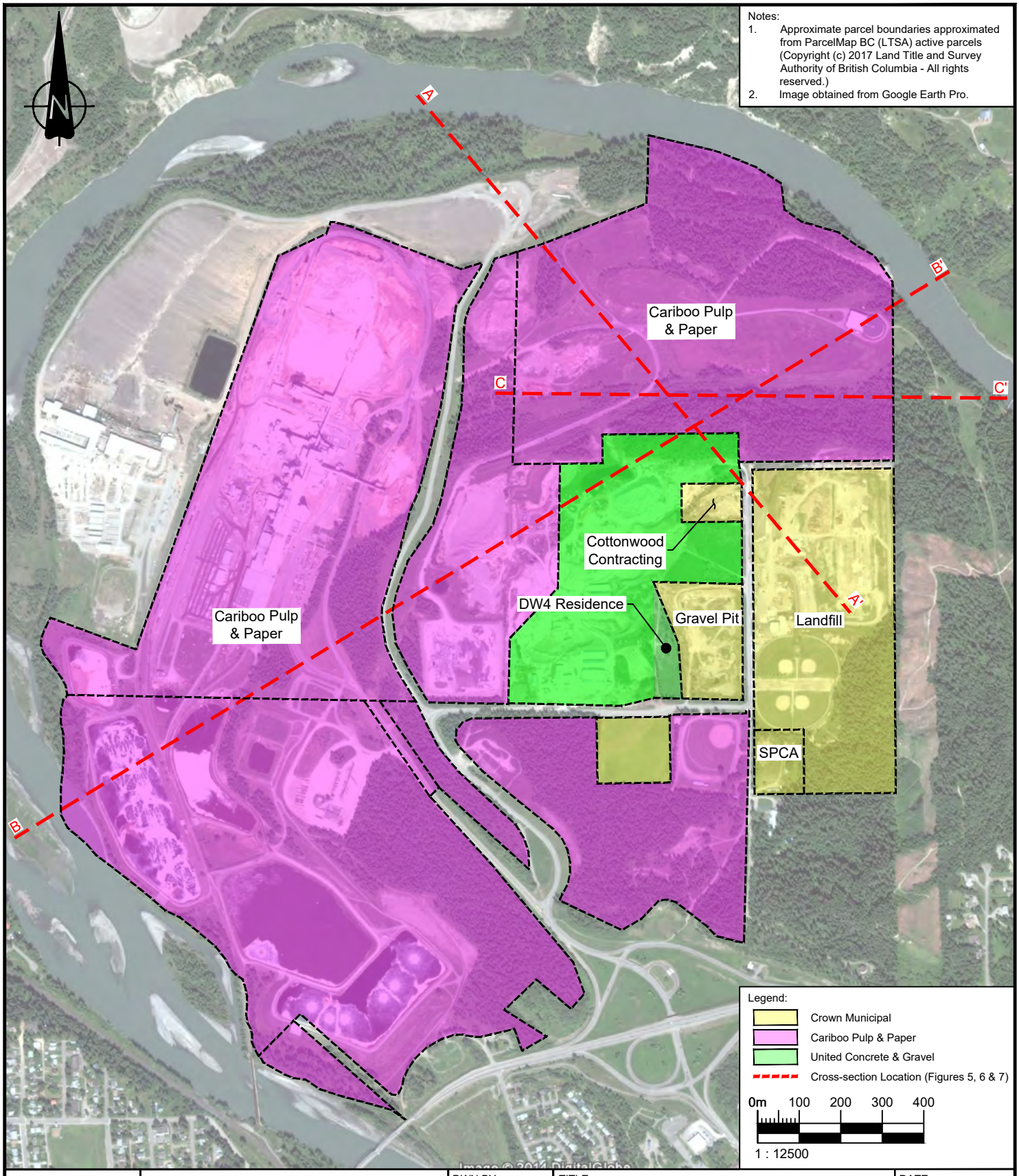
Figures



Note: Imagery provided by Spectrum Digital Imaging.

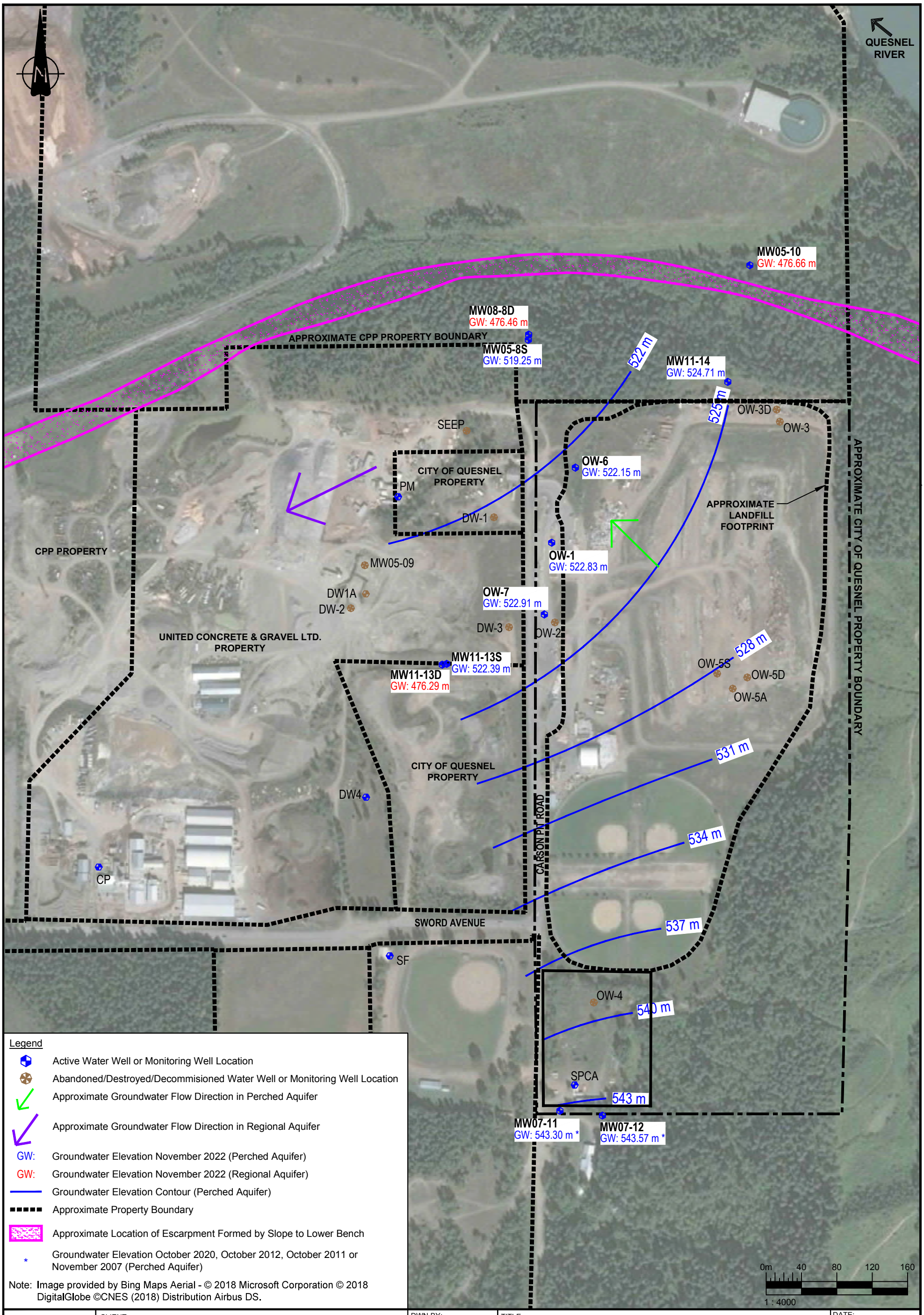
CLIENT: CITY OF QUESNEL	DWN BY: BB	TITLE: SITE LOCATION PLAN	DATE: FEBRUARY 2023	
	CHK'D BY: LK		PROJECT NO: KX05593.4	
WSP E&I Canada Limited 3456 Opie Crescent Prince George, BC, CANADA V2N 2P9 Tel. (250) 564-3243 Fax (250) 562-7045	DATUM: NAD 83	PROJECT: 2022 ANNUAL MONITORING REPORT QUESNEL MUNICIPAL LANDFILL QUESNEL, BC	REV. NO: A	
	PROJECTION: UTM Zone 10			
	SCALE: 1:50 000		FIGURE 1	

S:\Internal\KX05593-CoQ-2022LandfillGWMonitor-CAD\2022AnnualDeliverable\KX05593.4-Fig1-SiteLocationPlan.dwg – 1 – Feb. 02, 2023 10:43am – benjamin.brown2



WSP E&I Canada Limited 3456 Opie Crescent Prince George, BC, CANADA V2N 2P9 Tel. (250) 564-3243 Fax (250) 562-7045	CLIENT: CITY OF QUESNEL	DWN BY: BB CHK'D BY: LK DATUM: NAD 83 PROJECTION: UTM Zone 10 SCALE: 1:12 500	TITLE: SURROUNDING LAND USE PROJECT: 2022 ANNUAL MONITORING REPORT QUESNEL MUNICIPAL LANDFILL QUESNEL, BC	DATE: FEBRUARY 2023 PROJECT NO: KX05593.4 REV. NO: A FIGURE 2

S:\Internal\KX05593-CoQ-2022LandfillGWMonitor-CAD\2022AnnualDeliverable\KX05593.4-Fig2-SurrLandUse.dwg – 1



Legend

- Active Water Well or Monitoring Well Location
- Abandoned/Destroyed/Decommisioned Water Well or Monitoring Well Location
- Approximate Groundwater Flow Direction in Perched Aquifer
- Approximate Groundwater Flow Direction in Regional Aquifer
- GW: Groundwater Elevation November 2022 (Perched Aquifer)
- GW: Groundwater Elevation November 2022 (Regional Aquifer)
- Groundwater Elevation Contour (Perched Aquifer)
- Approximate Property Boundary
- Approximate Location of Escarpment Formed by Slope to Lower Bench
- * Groundwater Elevation October 2020, October 2012, October 2011 or November 2007 (Perched Aquifer)

Note: Image provided by Bing Maps Aerial - © 2018 Microsoft Corporation © 2018 DigitalGlobe ©CNES (2018) Distribution Airbus DS.

CLIENT:	CITY OF QUESNEL
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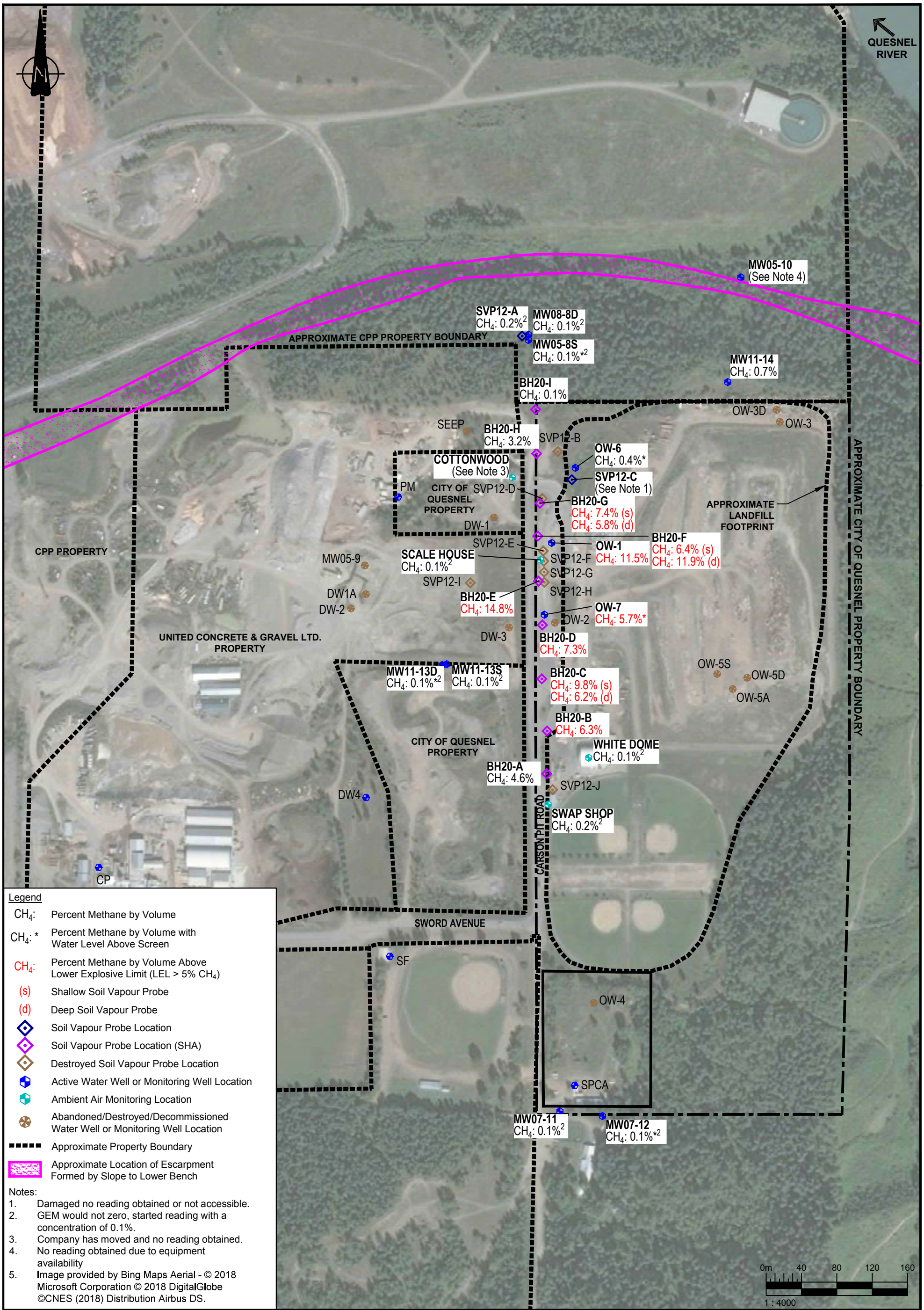
DWN BY:	BB
CHK'D BY:	LK
DATUM:	NAD 83
PROJECTION:	UTM Zone 10
SCALE:	1:4 000
TITLE:	SITE PLAN WITH GROUNDWATER ELEVATIONS NOVEMBER 2022
PROJECT:	2022 ANNUAL MONITORING REPORT QUESNEL MUNICIPAL LANDFILL QUESNEL, BC
DATE:	FEBRUARY 2023
PROJECT NO:	KX05593.4
REV. NO:	A
	FIGURE 3

S:\Internal\KX05593-CoQ-2022LandfillGWMonitor-CAD\2022AnnualDeliverable\KX05593.4-Fig3-SitePlan-Nov2022-GWElev.dwg – 1



Legend

CH_4:	Percent Methane by Volume
CH_4: *	Percent Methane by Volume with Water Level Above Screen
CH_4:	Percent Methane by Volume Above Lower Explosive Limit (LEL > 5% CH_4)
(s)	Shallow Soil Vapour Probe
(d)	Deep Soil Vapour Probe
	Soil Vapour Probe Location
	Soil Vapour Probe Location (SHA)
	Destroyed Soil Vapour Probe Location
	Active Water Well or Monitoring Well Location
	Ambient Air Monitoring Location
	Abandoned/Destroyed/Decommissioned Water Well or Monitoring Well Location
	Approximate Property Boundary
	Approximate Location of Escarpment Formed by Slope to Lower Bench

Notes:
1. Damaged no reading obtained or not accessible.
2. GEM would not zero, started reading with a concentration of 0.1%.
3. Company has moved and no reading obtained.
4. No reading obtained due to equipment availability
5. Image provided by Bing Maps Aerial - © 2018 Microsoft Corporation © 2018 DigitalGlobe ©CNES (2018) Distribution Airbus DS.

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DWN BY:	BB
CHK'D BY:	LK
DATUM:	NAD 83
PROJECTION:	UTM Zone 10
SCALE:	1:4 000

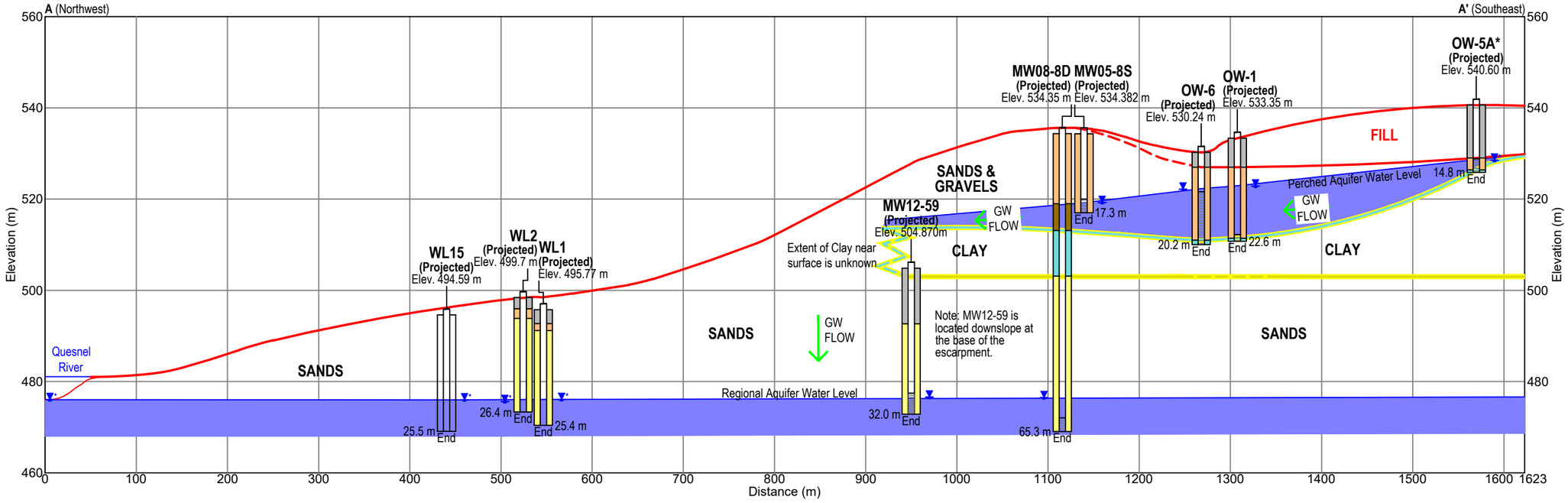
TITLE: SITE PLAN WITH METHANE CONCENTRATIONS NOVEMBER 2022

PROJECT: 2022 ANNUAL MONITORING REPORT QUESNEL MUNICIPAL LANDFILL QUESNEL, BC

DATE:	FEBRUARY 2023
PROJECT NO:	KX05593.4
REV. NO:	A

FIGURE 4

S:\Internal\KX05593-CoQ-2022LandfillGWMonitor-CAD\2022AnnualDeliverable\KX05593.4-Fig4-SitePlan-Nov2022-MethConcent.dwg – 1



Cross Section Legend:

- Sand
- Clay
- Sands and Gravels
- Fill

Stratigraphy Intersected by Borehole

- Slotted Screen
- Projected Ground Surface
- Water Level November 2022
- Water Level September 2014, October 2013 or October 2011

Horizontal 1 : 5000 (0m, 50, 100, 150, 200)

Vertical 1 : 1000 (0m, 10, 20, 30, 40)

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CLIENT: CITY OF QUESNEL

DWN BY: BB
CHK'D BY: LK
DATUM: N/A
PROJECTION: N/A
SCALE: AS SHOWN

TITLE: CROSS-SECTION A-A'

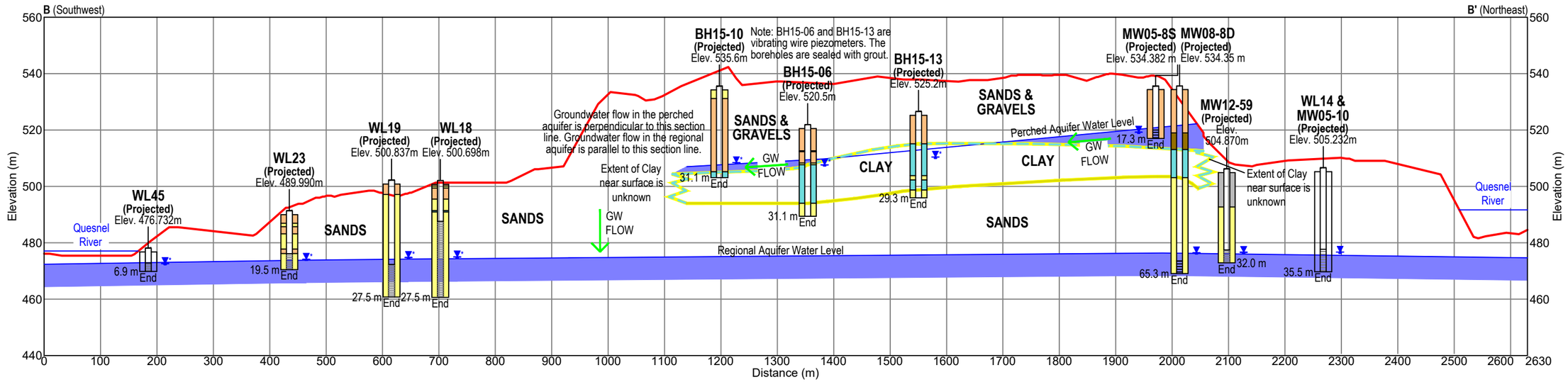
PROJECT: 2022 ANNUAL MONITORING REPORT
QUESNEL MUNICIPAL LANDFILL
QUESNEL, BC

DATE: FEBRUARY 2023
PROJECT NO.: KX05593.4
REV. NO.: A

FIGURE 5

S:\Internal\KX05593-CoQ-2022LandfillGWMonitor-CAD\2022AnnualDeliverable\KX05593.4-Fig5-7-CrossSect.dwg - A-A' - Feb. 02, 2023 11:59am - benjamin.brown2

This drawing was originally produced in colour.



Cross Section Legend:

- Sand
- Clay
- Sands and Gravels
- Fill

Stratigraphy Intersected by Borehole

- Slotted Screen
- Projected Ground Surface
- Water Level November 2022
- Water Level October 2015 or September 2014

Horizontal 1 : 7500 (0m, 100, 200, 300, 400)

Vertical 1 : 1500 (0m, 20, 40, 60, 80)

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DWN BY: BB
CHK'D BY: LK
DATUM: N/A
PROJECTION: N/A
SCALE: AS SHOWN

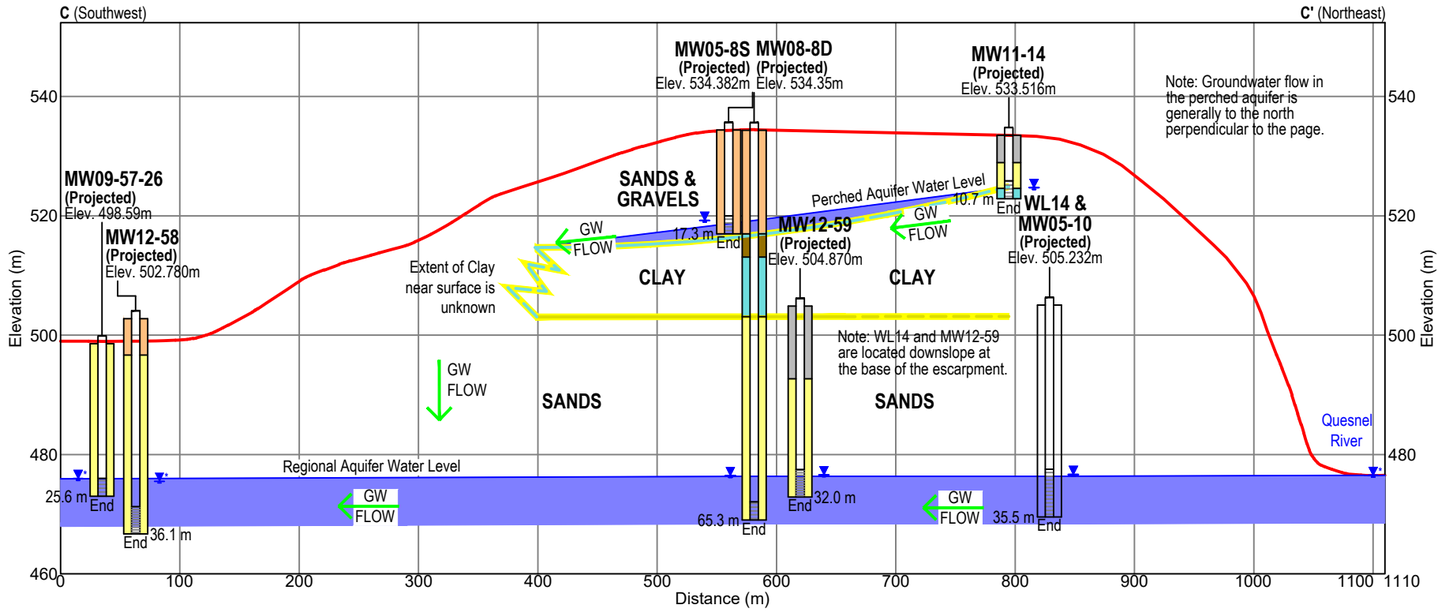
TITLE: CROSS-SECTION B-B'

PROJECT: 2022 ANNUAL MONITORING REPORT
QUESNEL MUNICIPAL LANDFILL
QUESNEL, BC

DATE: FEBRUARY 2023
PROJECT NO.: KX05593.4
REV. NO.: A

FIGURE 6

This drawing was originally produced in colour.



Cross Section Legend:

- Sand
- Clay
- Sands and Gravels
- Fill

Stratigraphy Intersected by Borehole

- Slotted Screen
- Projected Ground Surface
- Water Level November 2022
- Water Level September 2016 or September 2014

Horizontal 1 : 5000 — 0m 50 100 150 200

Vertical 1 : 1000 — 0m 10 20 30 40

CLIENT: CITY OF QUESNEL

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3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243 Fax (250) 562-7045

DWN BY: BB
CHK'D BY: LK
DATUM: N/A
PROJECTION: N/A
SCALE: AS SHOWN

TITLE: CROSS-SECTION C-C'

PROJECT: 2022 ANNUAL MONITORING REPORT
QUESNEL MUNICIPAL LANDFILL
QUESNEL, BC

DATE: FEBRUARY 2023
PROJECT NO.: KX05593.4
REV. NO.: A

FIGURE 7

This drawing was originally produced in colour.

Appendix B

Operational Certificate No. 3132

July 26, 2021

Tracking Number: 398549
Authorization Number: 3132

REGISTERED MAIL

City of Quesnel
410 Kinchant Street
Quesnel BC V2J 7J5

Dear Operational Certificate Holder:

Enclosed is Amended Operational Certificate 3132 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 Fees 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. 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 authorization are carried out with regards to the rights of third parties and comply with other applicable legislation that may be in force.

When a spill occurs, or there is an imminent risk of one occurring, the responsible person must ensure that it is reported in accordance with the Spill Reporting Regulation. Additional information on spill reporting requirements is available at gov.bc.ca/reportaspill

The Director may require the Operational Certificate holder to repair, remove, or add to existing works, or to construct new works, and to submit plans and specifications for works specified in this authorization.

The Director may require the Operational Certificate holder to conduct additional monitoring, and may specify procedures for monitoring, analysis, and procedures or requirements respecting the handling, treatment, transportation, discharge or storage of waste.

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

Ministry of Environment
Environmental Protection Division
Suite 400 - 640 Borland St.
Williams Lake, BC V2G 4T1
Southern Interior - Cariboo
Telephone: (250) 398-4530
Facsimile: (250) 398-4214

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. Plans, data and reports pertinent to the Operational Certificate are to be submitted by email or electronic transfer to the Director, designated Officer, or as further instructed. To meet the reporting requirements in a form and manner acceptable to the Director, reports and notifications related to the administration of this Operational Certificate must be submitted electronically to the following ministry email addresses:

- EnvAuthorizationsReporting@gov.bc.ca for monitoring and annual reports
- EnvironmentalCompliance@gov.bc.ca for non-compliance reports.

For further information about how to submit data and reports, please refer to http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge- authorization/data-and-report-submissions.

For more information about how the Ministry will assesses 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

Yours truly,

Karen Moores, P.Ag.
for Director, *Environmental Management Act*
Authorizations - North Region

MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

OPERATIONAL CERTIFICATE

3132

Under the Provisions of the Environmental Management Act and in accordance with the approved Cariboo Regional District Solid Waste Management Plan

CITY OF QUESNEL

410 Kinchant Street
Quesnel, British Columbia

is authorized to discharge refuse to land from the City of Quesnel and electoral areas A, B, C and I of the Cariboo Regional District, subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may result in prosecution.

Capitalized terms referred to in this authorization are defined in the attached Glossary. Other terms used in this authorization have the same meaning as those defined in the *Environmental Management Act* and applicable regulations.

Where this authorization provides that the Director may require an action to be carried out, the Operational Certificate Holder must carry out the action in accordance with the requirements of the Director.

This Operational Certificate supersedes all previous versions of Operational Certificate MR 3132 issued pursuant to Part 3, Section 28 of the *Environmental Management Act*.

GLOSSARY

"Officer: means: An Officer as defined by Section 1(1) of the *Environmental Management Act*.
"Province" means: Her Majesty the Queen in right of British Columbia;
"Qualified Professional " means: a person who:
(a) Is an engineer, scientist or technologist specializing in a particular applied science or technology;
(b) Is registered in British Columbia with a professional organization, is

Date issued: February 28, 1974
Date amended: July 26, 2021
(most recent)

Karen Moores, P.Ag.
for Director, *Environmental Management Act*
Southern Interior - Cariboo

acting under that organization's code of ethics and is subject to disciplinary action by that organization;
(c) Through suitable education, experience, accreditation and knowledge respecting solid waste management and related engineering disciplines for the management of leachate, surface water, ground water, storm water, and landfill gas and other specialist disciplines, may reasonably be relied upon to provide advice within his or her area of expertise and to carry out duties or functions in those areas; and
(d) Provides the completed Declaration of Competency and Conflict of Interest Disclosure Statements.
All documents submitted to the Director by a Qualified Professional must be signed by the author(s).
"Regulatory Document" means: any document that the Operational Certificate Holder is required to provide 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

1. AUTHORIZED DISCHARGES

1.1. This subsection applies to the discharge of refuse to land from the City of Quesnel and electoral areas A, B, C and I of the Cariboo Regional District. The site reference number for this discharge is E209812.

1.1.1. Rate of Discharge

The maximum rate of discharge is 25,000 tonnes/year.

1.1.2. Characteristics of the Discharge

The refuse must be typical of municipal solid waste. Hazardous Waste must be excluded from the landfill except waste asbestos, hydrocarbon contaminated soils and household hazardous waste as outlined below.

The disposal of waste asbestos in compliance with the Hazardous Waste Regulation is authorized in accordance with the approved Operational Plan.

The management of hydrocarbon contaminated soils, in compliance with the Contaminated Sites Regulation and the approved

Operational Plan is authorized in an area of the landfill designated in the approved Operational Plan. Hydrocarbon contaminated soils meeting the Commercial standard of the Contaminated Sites Regulation may be used as intermediate cover.

1.1.3. Authorized Works

The authorized works are a landfill, surface drainage diversion system, monitoring wells and related appurtenances located approximately as shown on the attached site plan A.

1.1.4. Location of the Point of Discharge

The location of the facilities for the management of refuse to which this subsection is applicable is District Lot 6683, except Block A, and District Lot 7263, Cariboo Land District

2. DESIGN, OPERATIONS and CLOSURE PLAN

(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 November 30, 2021.

(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, conform with the most recent versions of these plans.

(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 specified in the preceding (a).

(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.

3. 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, following installation of gas migration control measures recommended by Sperling Hansen Associates in their Quesnel Landfill Gas Migration Risk Assessment report dated May 31st, 2021;

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

(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 of the Sperling Hansen Associates, Quesnel Landfill Gas Migration Risk Assessment report dated May 31, 2021 and the Letter of Assurance from Sperling Hansen Associates dated, July 23, 2021. The only building onsite that can have public use is the re-use building with the following requirements for public access to be completed before any public use:

i) Existing continuous ventilation system be maintained and under continuous operation;

ii) The LEL (Lower Explosive Limit) Sensor be regularly calibrated and tested as per manufacturer's recommendations, and records of such calibration must be maintained for inspection;

iii) The existing floor cracks must be sealed off before further use of the re-use building to prevent further gas migration through the building's foundation;

iv) An active gas migration control system (e.g., active LFG collection system or active perimeter gas migration control system be installed within a year);

v) Require building staff scan the building daily at the beginning of each day using a handheld gas detector to confirm concentrations are at a safe operation level and that readings be recorded. All sensor reading must indicate less than 5% LEL;

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Date amended: July 26, 2021
(most recent)

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for Director, *Environmental Management Act*
Southern Interior - Cariboo

vi) A open air structure may be used for public access to replace this enclosed structure at any time.

(c) A perimeter gas migration control system for the west side of the landfill must be implemented by July 31, 2022.

(d) The Operational Certificate holder must prepare and submit to the director a reassessment of the potential for landfill gas generation that is satisfactory to the director at least once every 5 years after the initial assessment has been received by the director. The next assessment must be submitted by March 31, 2024.

(e) Sampling for landfill gas, including but not limited to the following:

(i) Periodic sampling at monitoring wells and gas sampling ports, with locations and frequency to be based on the recommendation of a Qualified Professional.

(ii) Continuous combustible gas measurement in all buildings on the landfill property, as described in Section 9.0 of the Landfill Gas Management Facilities Design Guidelines.

(iii) Operation of portable continuous combustible gas measurement devices by all personnel working on the active face.

4. GENERAL REQUIREMENTS

4.1. Maintenance of Works and Emergency Procedures

The Operational Certificate holder must regularly inspect the Authorized Works and maintain them in good working order.

The Director may require the Operational Certificate holder to reduce or suspend operations until the Authorized Works have been restored, and/or corrective steps have been taken to prevent unauthorized discharges.

In the event of an emergency or condition beyond the control of the Operational Certificate holder including, but not limited to, unauthorized fires arising from spontaneous combustion or other causes, or detection of leachate on the site of the Facility, the Operational Certificate holder must take remedial action to prevent any unauthorized discharges. The Operational Certificate holder must immediately report the emergency or condition and

the remedial action that has and will be taken to the EnvironmentalCompliance@gov.bc.ca email address or as otherwise instructed by the Director.

4.2. Bypasses

The Operational Certificate holder must not allow any discharge authorized by this authorization to bypass the Authorized Works, except with the prior written approval of the Director.

4.3. Surface Runoff and Erosion Control

Surface runoff must be diverted so that it does not come into contact with the landfilled refuse. The surface runoff control system must convey all flows up to a 1 in 10 year, 24 hour storm event and must withstand, without significant physical damage, all flows up to a 1 in 100 year, 24 hour storm event. Surface runoff works must be inspected and serviced not less than twice per year; once after freshet and once prior to freeze-up.

4.4. Landfill Operation

The Operational Certificate Holder must operate the landfill in accordance with the Operational Plan approved by the Director. Updates to the Operational Plan must be submitted to the Director for approval at least 30 days prior to implementation. The Director may require modifications to the Operational Plan based upon evaluation of the annual report or any other information collected by Environmental Protection in connection with the discharge.

4.5. Wildlife and Insect Control

(a) The operational certificate holder must not allow a bear to access Attractants at the Facility. The operational certificate holder must immediately report any bear access to Attractants at the Facility, to the Conservation Officer Service, and immediately correct same.

(b) Electrified fencing must be maintained around the perimeter of the landfill such that dangerous wildlife are prevented from accessing putrescible waste during the period of March 15th to November 30th.

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Date amended: July 26, 2021
(most recent)

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for Director, *Environmental Management Act*
Southern Interior - Cariboo

(c) Animal Carcasses and wastes from fish, poultry, and meat processing shall be placed in a prepared trench or pit and cover it within two hours with 500mm of soil.

(d) The Director may require the operational certificate holder to construct or modify works, or follow specific operating instructions, if the Director is of the opinion that there is a possibility of a nuisance or hazard being caused by bears or other animals that are attracted to the Facility.

4.6. 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.

4.7. Litter Control

The Operational Certificate holder must use the best practical means available to prevent the scatter of litter at the site. The Operational Certificate holder must clean up any litter scattered into the neighboring property, along access roads, in drainage ditches, along litter control fences, into surrounding trees or elsewhere on the landfill site. The Director may require the Operational Certificate holder to implement a specified frequency of clean-up and other additional requirements for refuse scatter control.

4.8. Electrical Fencing

4.8.1. Design, Construction and Maintenance

The electric fencing must be designed, constructed, and maintained such that bears are prevented from penetrating the fence throughout the operating period. The Director must be advised of any modifications to the fence.

4.8.2. Fence Type – Fabric, Spacing, Posts

Fencing may be either high tensile smooth wire or fence fabric (e.g., mesh-wire, page-wire, chain link or the like). The configuration of a high tensile smooth wire fence must consist of a minimum of eight strands, with four energized strands alternating with four grounded strands. The bottom strand must be a grounded or (-) strand and must not be more than 10 cm from the ground (soil) at any location. The

strands must be spaced apart, starting from the bottom strand, as follows (tolerance 2cm): 15, 15, 20, 20, 25, 25, and 25.

A fence fabric may be used instead of high tensile smooth wire. The fence fabric must : be a minimum of 1.22 meter high; be constructed of a minimum wire thickness of 11 gauge, and have a maximum mesh size of 15 cm. The bottom of the fabric must not be more than 10 cm from the ground (soil) at any location. Any uncharged fence fabric must have a minimum of four strands of charged wires on an outrigger system, spaced as follows: the first strand must not be higher than 25 cm from the ground; and each of the remaining three strands must be spaced approximately 25 cm apart from adjacent charged strands.

Fence posts must be spaced a maximum of 7.5 (tolerance 0.5 metres apart).

4.8.3. Fence Tension

The electric fence strands must be tightened to a minimum of 125 lbs. tension at 20 degrees Celsius. The required tension is to be corrected for temperature by use of the following formula for 12 1/2 gauge high tensile steel wire:

$$\text{Tension} = 125\text{-}2.5(\text{Temperature} - 20)$$

where: Tension is in pounds force; Temperature is in degrees Celsius

4.8.4. Fence Grounding

A grounding system must be installed consisting of solid grounding rods (i.e., not pipe) with a minimum diameter of 16 mm (5/8 inch) that have a buried length of at least 2 meters. A minimum of three grounding rods (spaced at least 3 meters apart) must be installed and connected to the energizer. Alternative energizer grounding systems (e.g., grounding plates, or a deep-driven grounding system) may be used provided the grounding is equivalent to or better than three grounding rods. A grounding rod (or equivalent) must be installed at least once every 450 meters along the fence and connected to the grounded wire stands or uncharged fence fabric. Additional grounding may be required for dry sites or if other conditions affect proper grounding.

4.8.5. Operating Period

The electric fence must be fully operational during the period of April 1st to November 30th inclusive each year and at any other time of year when there is bear activity in the immediate surrounding area. If snow is present during this period, any electrified strands above snow line must be isolated from the remainder of the system and energized. The Director may vary the operating period with prior written authorization.

4.8.6. Minimum Voltage

The electric fence must be operated with a minimum voltage of 5000 volts. The entire perimeter of the electric fence must be inspected each day the landfill is open during the operating period and the voltage of the fencing measured at several points along the fence. The results of the voltage testing must be recorded in a logbook. Any results less than the minimum 5000 volts must be immediately investigated for the cause of the low voltage (e.g., low battery, litter, vegetation, loose or crossed wires, broken insulators, breaks in the grounding system, etc.). Any problems that affect operation of the fence are to be immediately corrected (e.g. replacement of broken insulators, brush and litter removal to prevent grounding, etc.).

4.8.7. Gate(s)

Any access through electric fencing for vehicles, equipment and personnel must consist of an electrified gate system that is closed during non-operating hours. The gate system must be electrified to a minimum voltage of 5000 volts at all times except when being opened or closed. Any gate that is open during operating hours must be periodically checked by the attendant for bear activity during hours of operation. Gaps between the gate and the fence and ground, and between gate panels (for a double-hung gate) must not exceed 10 cm.

4.8.8. Recording and Reporting

Signs of digging or other attempts to penetrate electric fencing shall be recorded in a logbook. Any penetrations through electric fencing by bears shall be immediately reported to the Conservation Officer Service.

4.9. Buffer Zone

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Date amended: July 26, 2021
(most recent)

Karen Moores, P.Ag.
for Director, *Environmental Management Act*
Southern Interior - Cariboo

The Operational Certificate holder must not landfill material within 50 meters of the boundary of the property on which the facility is located except for the existing waste on the north and eastern side of the landfill as shown in the site plan B.

4.10. Site Closure and Restoration

At least one year prior to the final closure of the landfill, the Operational Certificate Holder must submit a final closure plan for the approval of the Director.

5. MONITORING REQUIMENTS

5.1. Monitoring Plan

The Operational Certificate Holder must maintain a Monitoring Plan approved by the Director. The Monitoring Plan must contain a Quality Assurance Manual consistent with the "British Columbia Field Sampling Manual For Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment and Biological Samples," 2003 Edition (Permittee). The Operational Certificate Holder must ensure that all data submitted as a requirement of this Operational Certificate is produced in accordance with the Quality Assurance Manual.

The Operational Certificate Holder must conduct a monitoring program in accordance with the approved Monitoring Plan. The Director may require modifications to the Monitoring Plan based upon the annual report or any other information collected by Environmental Protection in connection with this discharge. Updates to the Monitoring Plan must be submitted for the approval of the Director at least 30 days prior to implementation.

The Director may require the Operational Certificate Holder to conduct monitoring, and may specify procedures for monitoring and analysis, and procedures or requirements respecting the handling, treatment, transportation, discharge or storage of waste.

The Director may amend any requirements under this section, including requiring increased or decreased monitoring for the discharge and/or receiving environment based on data submitted by the Operational Certificate Holder and any other information gathered in connection with this authorization.

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Date amended: July 26, 2021
(most recent)

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5.2. Groundwater Monitoring

The Operational Certificate Holder must cause a qualified professional to develop a monitoring program and identify potential environmental impacts of the discharge to the receiving environment. The Operational Certificate Holder must conduct a ground water monitoring program that is satisfactory to the Director. The Operational Certificate Holder must install and maintain ground water monitoring wells, with the numbers, locations and design and installation details that are satisfactory to the Director.

Location	Parameter	Frequency
For Perched Aquifer MW07-12, OW-1, OW-6, OW-7, MW05-8S, MW11-13S, MW11-14 & PM For Regional Aquifer DW-4, MW05-10, MW08-08D, MW11-13D, SF & CP	Field Measurements pH, conductivity, temperature, water elevation Lab Measurements pH, Conductivity, Specific Conductance, TSS, TDS, Alkalinity Total (CaCO3), bromide, chloride, fluoride, sulphate, hardness, BOD, COD, Ammonia, Nitrate + Nitrite, Nitrate, Nitrite, Orthophosphate and Dissolved metals	Bi-annual

5.3. Soil Gas Monitoring

Soil gas monitoring shall be as specified in the Qualified Professional report from Section 3, submitted and implemented by May 31, 2021 and with the following minimum to be included

Location	Parameter	Frequency
SVP12-A, SVP12-B, SVP12-C, BH-20-A, BH-20-B, BH-20-C(d), BH-20-C(s), BH-20-D, BH-	Methane	Bi-annual

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20-E, BH-20-F(d), BH-20-F(s), BH-20-G(d), BH-20-G(s), BH-20-H & BH-20-I		

5.4. Sampling Procedures

The Operational Certificate holder must carry out 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/bc-field-sampling-manual.

5.5. Analytical Procedures

The Operational Certificate holder must carry out 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/bc-field-sampling-manual.

5.6. Quality assurance/Quality Control (QA/QC)

(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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(b) The Operational Certificate Holder must prepare and submit for analysis by the analytical laboratory(ies) a duplicate sample for each parameter sampled at each monitoring site and each monitoring period.

(c) 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.

6. REPORING REQUIREMENT

The Operational Certificate Holder must submit all data required to be submitted under this section by email to the Ministry's Routine Environmental Reporting Submission Mailbox (RERSM) 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: https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/routine-environmental-reporting-submission-mailbox

The Operational Certificate Holder must maintain records of all monitoring data and must submit the results of water sample analysis in an electronic format suitable for entry into the provincial database known as EMS.

6.1. Annual Reporting

An annual report must be submitted by March 31st of each year. The annual report must present an assessment of monitoring results from the previous year and provide an interpretation of the effects of the discharge on the receiving environment. The report must include an assessment, completed by a Qualified Professional, of compliance with the landfill development requirements of the approved Operational Plan, including the quantity and source of landfilled waste, significant maintenance and inspectional activities and survey and as-built records for the reporting period. A copy of the latest annual report and a current copy of the approved Operational Plan must be placed in the Quesnel Public Library.

Analysis of samples for parameters designated under the Environmental Data Quality Assurance Regulation must be at a laboratory registered for the designated parameter under the Regulation. The Operational Certificate Holder must participate in quality assurance audits as required by the regulation.

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6.2. Non-compliance Notification

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 and take remedial action to remedy any effects of such non-compliance.
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.

6.3. Non-compliance Reporting

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 includes, but is not necessarily limited to, the following:

(a) all relevant test results obtained by the Operational Certificate Holder related to the non- compliance,

(b) an explanation of the most probable cause(s) of the non-compliance, and

(c) a description of remedial action planned and/or taken by the Operational Certificate Holder to prevent similar non-compliance(s) in the future.

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 (CRSM) 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: https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/compliance-reporting-mailbox

6.4. Spill Reporting

The Operational Certificate Holder must immediately report all spills to the environment (as defined in the Spill Reporting Regulation) in accordance

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with the Spill Reporting Regulation, which among other things, requires notification to Emergency Management BC at 1-800-663-3456

7. PUBLICATION OF DOCUMENT

The Ministry of Environment and Climate Change Strategy publishes Regulatory Documents on its website for the purpose of research, public education and to provide transparency in the administration of environmental laws. The operational certificate holder acknowledges that the Province may publish any Regulatory Documents submitted by the operational certificate holder, excluding information that would be exempted from disclosure if the document was disclosed pursuant to a request under section 5 of the Freedom of Information and Protection of Privacy Act, and the operational certificate holder consents to such publication by the Province.

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SITE PLAN A

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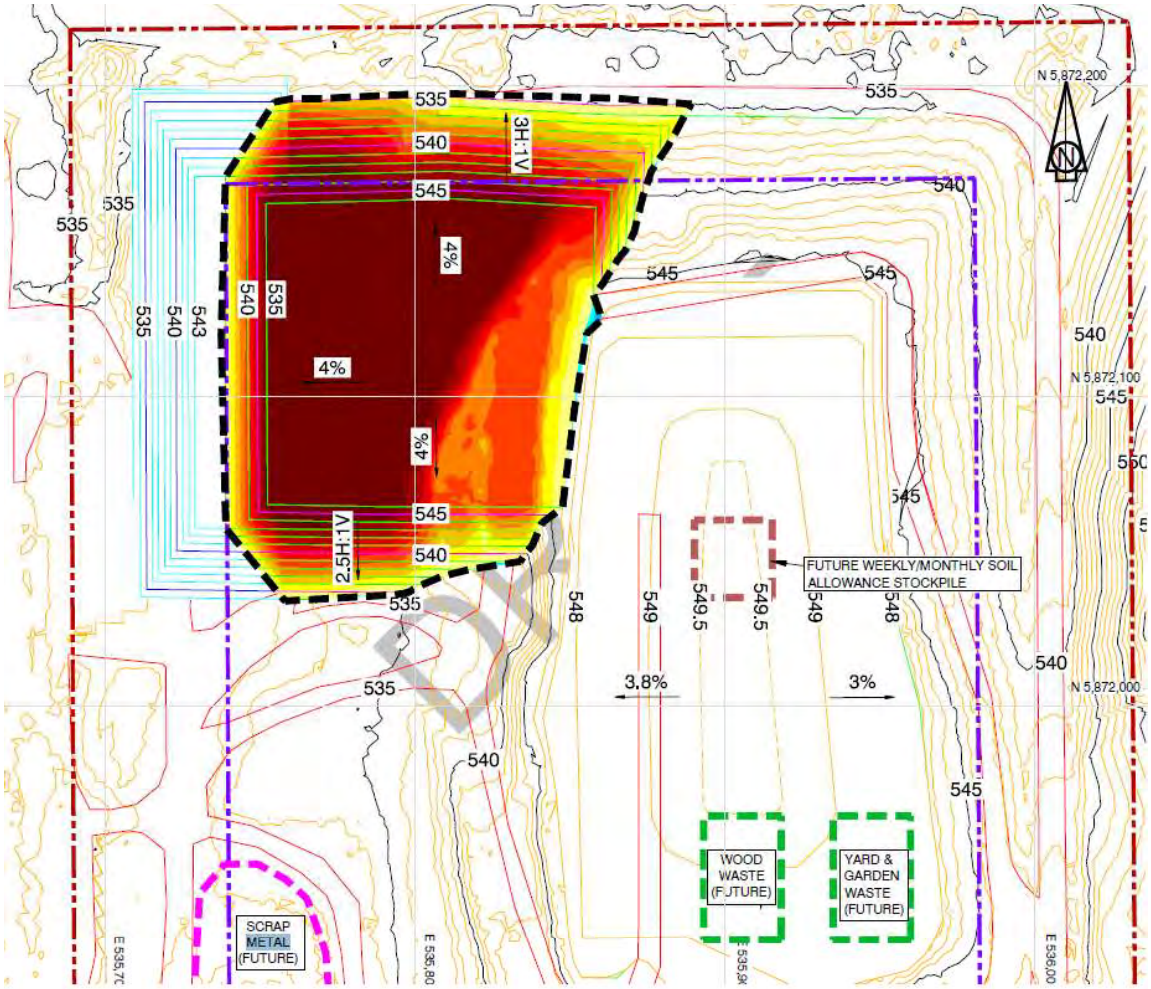
SITE PLAN B



LEGEND:

- 5m EXISTING CONTOUR
- 1m EXISTING CONTOUR
- 5m BERM DESIGN CONTOUR
- 1m BERM DESIGN CONTOUR
- 5m DESIGN CONTOUR
- 1m DESIGN CONTOUR
- ROAD
- PROPERTY LINE
- 50m BUFFER
- PHASE BOUNDARY

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Appendix C

Photographs

PHOTOGRAPH 1: OW-6 prior to construction 6 May 2022.

PHOTOGRAPH 2&3: Upgrading OW-6 by extending to new elevation of 537.98 m ASL (30 June 2022).

	PROJECT: 2022 Annual Monitoring Report				
	TITLE: Quesnel Municipal Landfill, Quesnel, BC 2022 Photographs				
CLIENT: **City of Quesnel**	DATE: January 2023	JOB No.: KX05593	SCALE: N.T.S	FIGURE: Photos	REV. A

PHOTOGRAPH 4: Looking north. OW-6 extended to accommodate new toe berm.

PHOTOGRAPH 5: Looking north. OW-6 after new toe berm (18 October 2022)

	PROJECT: 2022 Annual Monitoring Report				
	TITLE: Quesnel Municipal Landfill, Quesnel, BC 2022 Photographs				
CLIENT: **City of Quesnel**	DATE: January 2023	JOB No.: KX05593	SCALE: N.T.S	FIGURE: Photos	REV. A

PHOTOGRAPH 6: SVP12-C buried under pilon and soil.

PHOTOGRAPH 7: Undercutting of area below access to MW11-13D and MW11-13S.

	PROJECT: 2022 Annual Monitoring Report				
wsp	TITLE: Quesnel Municipal Landfill, Quesnel, BC 2022 Photographs				
CLIENT: **City of Quesnel**	DATE: January 2023	JOB No.: KX05593	SCALE: N.T.S	FIGURE: Photos	REV. A

Appendix D

Borehole Logs

CLIENT: City of Quesnel	PROJECT: Landfill Well Installation 2011	BOREHOLE NO: **BH11-13D**
DRILLER: Cariboo Water Wells	City of Quesnel Landfill	PROJECT NO: KX05285
DRILL TYPE/METHOD: Air Rotary	NORTHING: 535565 EASTING: 5871917	ELEVATION: 534.04 m

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	ADDITIONAL INFORMATION	ELEVATION (m)
0		SAND and silt, trace gravel, sub-angular to sub-rounded gravel, medium density, brown, moist				-Stickup -1.2m above ground surface -51mm PVC monitoring well installed from surface to 64.0m -3.1m screen installed in saturated zone -0.15m diameter casing pulled back to 48.8m and sandlocked	533
1							532
2							531
3		- gravel with sand, no silt, angular to sub-rounded gravel, dry at 3.6m					530
4							529
5							528
6							527
7		- well rounded gravel, moist at 7.6m - sandy, tan, moist at 8.3m					526
8							525
9		10.1m					524
10		SILT, trace sand and gravel, sub-angular to rounded gravel, low density, low plasticity, brown-gray, moist to dry					523
11		11.6m 12.2m					522
12		SAND and gravel, trace silt, low plastict, low density, sub-angular to sub-rounded gravel, brown - gray, moist - saturated at 11.8m					521
13							520
14							519
15		CLAY, some silt, trace sand, medium plastic, medium density, grey, moist to wet					518
16							517
17							516
18							515
19							514
20							513
21							512
22							511
23							510
24							509
25							508
26							507
27							506
28							505
29							504
30							503
31		32.0m					502
32		SAND, fine to medium grained, low density, grey, moist					501
33							500
34							499
35							498
36							497
37							496
38							495
39		- some gravel, well rounded at 39.6m					494
40							493
41							492
42		- very fine grained, grey to black, moist at 42.7m					491
43							490
44							489
45							488
46							487
47							486
48							485
49							
50							

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Tel: (250) 564-3243

LOGGED BY: LC
ENTERED BY: LC
COMPLETION DEPTH: 64.0 m
COMPLETION DATE: 5/26/11

CLIENT: City of Quesnel	PROJECT: Landfill Well Installation 2011	BOREHOLE NO: **BH11-13D**
DRILLER: Cariboo Water Wells	City of Quesnel Landfill	PROJECT NO: KX05285
DRILL TYPE/METHOD: Air Rotary	NORTHING: 535565 EASTING: 5871917	ELEVATION: 534.04 m

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	ADDITIONAL INFORMATION	ELEVATION (m)
50–59		SAND, fine to medium grained, low density, grey, moist *(continued)* - fine to medium grained, trace grave, sub-rounded to rounded at 50.3m					483–476
59.2m						Water Level observed at 58.8m below ground surface on May 24, 2011	
59–64		GRAVEL, some sand, trace silt, sub-rounded to rounded, brown, saturated					475–470
64.0m		Casing pulled back to 48.8m and sandlocked End of hole at 64.0m 51mm PVC monitoring well installed					
64–100							469–435

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LOGGED BY: LC
ENTERED BY: LC
COMPLETION DEPTH: 64.0 m
COMPLETION DATE: 5/26/11

CLIENT: City of Quesnel	PROJECT: Landfill Well Installation 2011	BOREHOLE NO: **BH11-13S**
DRILLER: Uniwide Drilling	City of Quesnel Landfill	PROJECT NO: KX05285
DRILL TYPE/METHOD: Environmental Hammer	NORTHING: 535570 EASTING: 5871918	ELEVATION: 533.786 m

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	ADDITIONAL INFORMATION	ELEVATION (m)
0		SAND and gravel, some silt, sub-angular to well rounded gravel, low density, brown, dry to moist				-Stickup -1.2m above ground surface	533
1						-51mm PVC monitoring well installed from surface to11.58m -3.1m screen installed in saturated zone	532
2							531
3							530
4							529
5							528
6							527
7							526
8							525
9							524
10		10.4m					523
11		CLAY, some silt, trace gravel, sub-angular to sub-rounded gravel, low plastic, till, high density, grey, dry 11.6m					522
12		End of hole at 11.6m 51mm PVC Monitoring well installed					

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LOGGED BY: LC
ENTERED BY: LC
COMPLETION DEPTH: 11.6 m
COMPLETION DATE: 5/26/11

BOREHOLE LOG GINT US.GPJ AMEC-PG-MULTIWELL-DATATEMPLATE.GDT 7/6/11

CLIENT: City of Quesnel	PROJECT: Landfill Well Installation 2011	BOREHOLE NO: **BH11-14**
DRILLER: Uniwide Drilling	City of Quesnel Landfill	PROJECT NO: KX05285
DRILL TYPE/METHOD: Environmental Hammer	NORTHING: 535888 EASTING: 5872237	ELEVATION: 534.116 m

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	ADDITIONAL INFORMATION	ELEVATION (m)
0		HUMIC LAYER, root structures, some gravel and sand, low density, black, moist				Stickup -1.2m above ground surface	534
0.3		FILL (garbage), organic debris, plastic bags, metal strapping, some gravel and sand, landfill odour, moist				51mm PVC monitoring well installed from surface to10.52m 3.1m screen installed in saturated zone	
1							533
2							532
3							531
4							530
4.6		SAND and gravel, some silt, well rounded gravel, low density, brown, moist					
5							529
6							528
7							527
8		- water table at 8.4m					526
8.9		CLAY, some sand, trace gravel, medium plastic, medium density, grey to brown, moist				Water Level observed at 9.2m below ground surface on May 24, 2011	
9							525
10							524
10.5		End of hole at 10.5m 51mm PVC Monitoring well installed					
11							523
12							

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LOGGED BY: LC
ENTERED BY: LC
COMPLETION DEPTH: 10.5 m
COMPLETION DATE: 5/26/11

CLIENT: City of Quesnel	FIELD PERSONNEL: Ian Terry	BOREHOLE No: OW-5-17M
PROJECT: Landfill Expansion	DRILLING METHOD: Auger	Project No: 90-592-01-01
LOCATION: Quesnel, British Columbia	COORDINATES:	ELEVATION: 0.000 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

DEPTH (m)	SOIL SYMBOL	LITHOLOGY	WELL INSTALLATION	WELL COMPLETION DATA	DEPTH (m)
0.0		FILL; landfill material			0.0
1.0					1.0
2.0		SAND; brown, fine grained moist, silty		CUTTINGS	2.0
3.0				51 mm PVC CASING	3.0
4.0					4.0
5.0					5.0
6.0		CLAY; grey, stiff, low to medium plastic, stony			6.0
7.0					7.0
		grey, silty, medium plastic, stiff			
8.0					8.0
9.0					9.0
10.0					10.0
11.0				BENTONITE	11.0
12.0					12.0
13.0					13.0
14.0					14.0
15.0					15.0
16.0				FRAC SAND	16.0
17.0				10 SLOT WELL SCREEN	17.0
18.0					18.0
19.0					19.0
20.0					20.0

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LOGGED BY: IAN TERRY	COMPLETION DEPTH: 17.1 m
REVIEWED BY:	COMPLETE:
Fig. No:	Page 1 of 1

CLIENT: City of Quesnel	FIELD PERSONNEL: Ian Terry	BOREHOLE No: OW-5-8M
PROJECT: Landfill Expansion	DRILLING METHOD: Auger	Project No: 90-592-01-01
LOCATION: Quesnel, British Columbia	COORDINATES:	ELEVATION: 0.000 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

DEPTH (m)	SOIL SYMBOL	LITHOLOGY	WELL INSTALLATION	WELL COMPLETION DATA	DEPTH (m)
0.0		FILL; landfill material			0.0
1.0					1.0
2.0		SAND; brown, fine grained moist, silty			2.0
3.0					3.0
4.0					4.0
5.0					5.0
6.0		CLAY; grey, stiff, low to medium plastic, stony			6.0
7.0		grey, silty, medium plastic, stiff			7.0
8.0					8.0
9.0					9.0
10.0					10.0
11.0					11.0
12.0					12.0
13.0					13.0
14.0					14.0
15.0					15.0
16.0					16.0
17.0					17.0
18.0					18.0
19.0					19.0
20.0					20.0

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LOGGED BY: IAN TERRY	COMPLETION DEPTH: 7.9 m
REVIEWED BY:	COMPLETE:
Fig. No:	Page 1 of 1

CLIENT: City of Quesnel	FIELD PERSONNEL: Ian Terry	BOREHOLE No: OW-6
PROJECT: Landfill Expansion	DRILLING METHOD: Auger	Project No: 90-592-01-01
LOCATION: Quesnel, British Columbia	COORDINATES:	ELEVATION: 0.000 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

DEPTH (m)	SOIL SYMBOL	LITHOLOGY	WELL INSTALLATION	WELL COMPLETION DATA	DEPTH (m)
0.0		SAND AND GRAVEL; coarsw grained, dry, hard drilling		BENTONITE	0.0
1.0					1.0
2.0				51 mm PVC CASING	2.0
3.0					3.0
4.0				NATIVE SAND	4.0
5.0					5.0
6.0		CLAY; grey, sitly, medium plastic, stiff		FRAC SAND	6.0
				10 SLOT WELL SCREEN	
7.0					7.0
8.0					8.0
9.0					9.0
10.0					10.0
11.0					11.0
12.0					12.0
13.0					13.0
14.0					14.0
15.0					15.0
16.0					16.0
17.0					17.0
18.0					18.0
19.0					19.0
20.0					20.0

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LOGGED BY: IAN TERRY	COMPLETION DEPTH: 6.7 m
REVIEWED BY:	COMPLETE:
Fig. No:	Page 1 of 1

CLIENT: City of Quesnel	FIELD PERSONNEL: Ian Terry	BOREHOLE No: OW-7
PROJECT: Landfill Expansion	DRILLING METHOD: Auger	Project No: 90-592-01-01
LOCATION: Quesnel, British Columbia	COORDINATES:	ELEVATION: 0.000 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

DEPTH (m)	SOIL SYMBOL	LITHOLOGY	WELL INSTALLATION	WELL COMPLETION DATA	DEPTH (m)
0.0		SAND AND GRAVEL; coarse grained, dry, hard drilling		-BENTONITE	0.0
1.0					1.0
		CLAY; grey, silty, medium plastic		-FRAC SAND	
2.0				-51 mm PVC CASING	2.0
3.0				-10 SLOT WELL SCREEN	3.0
				-BENTONITE	
4.0					4.0
5.0					5.0
6.0					6.0
7.0					7.0
8.0					8.0
9.0					9.0
10.0					10.0
11.0					11.0
12.0					12.0
13.0					13.0
14.0					14.0
15.0					15.0
16.0					16.0
17.0					17.0
18.0					18.0
19.0					19.0
20.0					20.0

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LOGGED BY: IAN TERRY	COMPLETION DEPTH: 5.5 m
REVIEWED BY:	COMPLETE:
Fig. No:	Page 1 of 1

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LOG OF BOREHOLE No. 1

City of Quesnel
Landfill Groundwater Monitoring Program
Quesnel, BC

LOGGED/DWN. RP/JF	CKD.	DATE OF INVEST. March 20, 1989	JOB NO. KX00436

WATER CONTENT% 10 20 30 40 50 60 — Wp-□ W-○ W_L-△

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION (DRILL TYPE; DATUM Ground Surface; SURFACE ELEVATION)	SAMPLE TYPE	OTHER TESTS: N
		SAND AND GRAVEL - brown		
0.8		SAND - silty, fine, brown, trace gravel		
2				
2.3		SAND AND GRAVEL - coarse, grey, angular		
4				
6				
8				
10				
12		Boulder at 12.5 m		
14				
16				
18				

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LOG OF BOREHOLE No. 1

City of Quesnel
Landfill Groundwater Monitoring Program
Quesnel, BC

LOGGED/DWN. RP/JF	CKD.	DATE OF INVEST. March 20, 1989	JOB NO. KX00436

WATER CONTENT% Wp-□ W-○ W_L-△
10 20 30 40 50 60

DRILL TYPE

SOIL DESCRIPTION

DATUM Ground Surface
SURFACE ELEVATION

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	OTHER TESTS: N
20				
22				
22.6		CLAY - grey, firm END OF TESTHOLE AT 22.6 m		
24				
26				
28				
30				
32				
34				
36				

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LOG OF BOREHOLE No. 2

City of Quesnel
Landfill Groundwater Monitoring Program
Quesnel, BC

LOGGED/DWN. RP/JF	CKD.	DATE OF INVEST.	JOB NO. KX00436

DRILL TYPE

DATUM Ground Surface
SURFACE ELEVATION

WATER CONTENT % Wp-□ w-○ w_L-△ (10 20 30 40 50 60)

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	OTHER TESTS: N
		SAND AND GRAVEL - brown, silty sand		
1.8				
2		SAND AND GRAVEL - coarse, boulders		
4				
6				
8				
10				
10.7		CLAY - grey, stoney		
12				
12.2		END OF TESTHOLE AT 12.2 m		
14				
16				
18				

Hardy BBT Limited
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

LOG OF BOREHOLE No. 3

City of Quesnel
Landfill Groundwater Monitoring Program
Quesnel, BC

LOGGED/DWN. RP/JF	CKD.	DATE OF INVEST.	JOB NO. KX00436

DRILL TYPE

WATER CONTENT % — Wp-□ W-○ W_L-△ — 10 20 30 40 50 60

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	OTHER TESTS: N
		DATUM Ground Surface SURFACE ELEVATION		
		SAND AND GRAVEL - brown, silty sand		
1.2		SAND AND GRAVEL - coarse, boulders		
2				
4				
4.6		CLAY - grey, stoney		
5.2		CLAY - grey, firm		
6				
8				
10				
12				
12.2		END OF TESTHOLE AT 12.2 m		
14				
16				
18				

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CONSULTING ENGINEERING & PROFESSIONAL SERVICES

LOG OF BOREHOLE No. 4

City of Quesnel
Landfill Groundwater Monitoring Program
Quesnel, BC

LOGGED/DWN. RP / JF	CKD.	DATE OF INVEST.	JOB NO. KX00436

DRILL TYPE

DATUM Ground Surface

SURFACE ELEVATION

WATER CONTENT% Wp-□ W-○ W_L-△ (10 20 30 40 50 60)

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	OTHER TESTS: N
		SAND AND GRAVEL - clayey		
1.2				
2.1		SAND AND GRAVEL - coarse		
2				
2.4		CLAY - brown, stoney		
		CLAY - grey, firm		
4				
6				
8				
10				
12				
12.2		END OF TESTHOLE AT 12.2 m		
14				
16				
18				

WELL CONSTRUCTION DETAILS

Well No.	Solid Casing (m Below Ground)	Slotted 4 Inch Casing (m Below Ground)	Machine Slotted 2 Inch Screen (m Below Ground)
OW-1	0.0 - 3.0	3.0 - 21.7	21.7 - 23.2
OW-2	0.0 - 3.0	3.0 - 9.3	9.3 - 10.9
OW-3	0.0 - 1.5	1.5 - 3.0	-
OW-4	0.0 - 0.8	0.8 - 3.0	-

City of Quesnel	Observation Well Installation	TEST HOLE No: OW5A
Quesnel, B.C.	Sanitary Landfill	PROJECT NO: KX002587
Air Rotary Drill Rig	East Side of the Landfill	ELEVATION: 31.48 (m)

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

DEPTH (m)	PLASTIC / M.C. / LIQUID	WELL INSTALLATION	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION	DEPTH (m)
0.0				FILL, wood debris, sandy				
1.0								
2.0								
3.0								
4.0								
5.0				SAND AND GRAVEL, grey – moist				
6.0				– wet				
7.0				CLAY, trace of gravel, grey				
8.0				END of hole @ 7.6 m Monitoring well installed Water level at 6.35 m following drilling				
9.0								
10.0								
11.0								
12.0								
13.0								
14.0								
15.0								
16.0								
17.0								
18.0								
19.0								
20.0								
21.0								
22.0								
23.0								
24.0								
25.0								
26.0								
27.0								
28.0								
29.0								
30.0								

AGRA Earth & Environmental Limited
Prince George, B.C.

LOGGED BY: BAN
REVIEWED BY: MCW
Fig. No: 2

COMPLETION DEPTH: 7.6 m
COMPLETED: 18/05/98

CLIENT: City of Quesnel	PROJECT: Landfill Monitoring Program	BOREHOLE NO: MW05-8s
DRILLER: Geotech Drilling	Quesnel, BC	PROJECT NO: KX04701
DRILL TYPE/METHOD: B-60/Odex		ELEVATION:

SAMPLE TYPE: TUBE, NO RECOVERY, SPLIT SPOON, GRAB, MUD RETURN, CORE RETURN

BACKFILL TYPE: BENTONITE, PEA GRAVEL, SLOUGH, GROUT, DRILL CUTTINGS, SAND

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION	MONITORING WELL	DEPTH (m)
0		SAND AND GRAVEL, trace silt, angular gravel, loose, medium brown, moist			Depth of Groundwater from Top of Pipe 15.84m on 23 Nov 2005 Stick up ~0.75m		
15		-wet			Water Level observed at 15.2m		15
18		End of Hole at 18.1 m Monitoring Well Installed.					18

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

AMEC Earth & Environmental 610 Richard Road Prince George, British Columbia Canada V2K 4L3	LOGGED BY: RH	COMPLETION DEPTH: 18.1 m
	ENTERED BY: SR	COMPLETION DATE: 9/15/05
	REVIEWED BY:	Page 1 of 1

CLIENT: City of Quesnel	PROJECT: Landfill Monitoring Program	BOREHOLE NO: MW05-8d
DRILLER: Geotech Drilling	Quesnel, BC	PROJECT NO: KX04701
DRILL TYPE/METHOD: B-80/Odex		ELEVATION:

SAMPLE TYPE: TUBE, NO RECOVERY, SPLIT SPOON, GRAB, MUD RETURN, CORE RETURN

BACKFILL TYPE: BENTONITE, PEA GRAVEL, SLOUGH, GROUT, DRILL CUTTINGS, SAND

DEPTH (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION
0	SAND AND GRAVEL, trace silt, angular gravel, loose, medium brown, moist			Depth of Groundwater from Top of Pipe 59.38 m on 21 Nov 2005 Stick up - 0.76m
2	-damp, compact			
2.5	-dense, dry			
11	-damp			
16	-moist, 60% to 70% rounded gravel			
17	-wet			
18.3	CLAY, some silt, some sand, trace gravel, hard, medium plastic, medium brown, moist (till) -trace sand, no gravel -no sand			

Depth scale: 0 to 20 m

MGGASTECH READINGS (PPM): 1, 10, 100, 1000, 10000

AMEC Earth & Environmental
610 Richard Road
Prince George, British Columbia
Canada V2K 4L3

LOGGED BY: RH	COMPLETION DEPTH: 61.0 m
ENTERED BY: SR	COMPLETION DATE: 9/15/05
REVIEWED BY:	

CLIENT: City of Quesnel	PROJECT: Landfill Monitoring Program	BOREHOLE NO: MW05-5d
DRILLER: Geotech Drilling	Quesnel, BC	PROJECT NO: 1000470
DRILL TYPE/METHOD: B-80/Odex		ELEVATION:

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION	MONITORING WELL	DEPTH (m)
20		CLAY, some silt, some sand, trace gravel, hard, medium plastic, medium brown, moist (till) (continued)					20
21							21
22							22
23							23
24							24
25							25
26							26
27							27
28							28
29							29
30							30
31		-some fine to medium grained sand					31
32		SAND AND CLAY, some silt, dense, non plastic, medium brown, wet					32
33		CLAY, some silt, trace sand, hard, medium plastic, medium brown, moist					33
34		SAND (fine grained), trace silt, dense, medium brown, moist					34
35		-trace clay, some silt, wet					35
36		SAND (fine grained), trace silt, dense, medium brown, moist					36
37							37
38		-fine to medium grained sand					38
39							39
40							40

AMEC Earth & Environmental
910 Richard Road
Prince George, British Columbia
Canada V2K 4L3

LOGGED BY: RH | COMPLETION DEPTH: 51.0 m
ENTERED BY: SR | COMPLETION DATE: 5/18/05
REVIEWED BY:

CLIENT: City of Quesnel	PROJECT: Landfill Monitoring Program	BOREHOLE NO: [illegible]
DRILLER: Geotech Drilling	Quesnel, BC	PROJECT NO: KX04701
DRILL TYPE/METHOD: B-80/Odex		ELEVATION:

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH (m)	RKI GASTECH READINGS (PPM) 1 / 10 / 100 / 1000 / 10000	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION	MONITORING WELL	DEPTH (m)
40			SAND (fine grained), trace silt, dense, medium brown, moist (continued)					40
45			-trace gravel, trace clay					45
59						Water Level observed at 59.3m		59
60								60

AMEC Earth & Environmental 810 Richard Road Prince George, British Columbia Canada V2K 4L3	LOGGED BY: RH	COMPLETION DEPTH: 61.0 m
	ENTERED BY: SR	COMPLETION DATE: [illegible]
	REVIEWED BY:	Page 3 of 4

CLIENT: City of Quesnel	PROJECT: Landfill Monitoring Program	BOREHOLE NO: MW06-4d
DRILLER: Geotech Drilling	Quesnel, BC	PROJECT NO: 1X04701
DRILL TYPE/METHOD: B-80/Odex		ELEVATION:

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH (m)	METRES READING (PPM)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION	MONITORING WELL	DEPTH (m)
60			SAND (fine grained, fine-silt, loose, medium brown, moist (continued)					60
61			End of Hole at 61.0 m Monitoring Well Installed.					61
62								62
63								63
64								64
65								65
66								66
67								67
68								68
69								69
70								70
71								71
72								72
73								73
74								74
75								75
76								76
77								77
78								78
79								79
80								

AMEC Earth & Environmental
910 Richard Road
Prince George, British Columbia
Canada V2K 4L3

LOGGED BY: RH | ENTERED BY: SR | REVIEWED BY:

COMPLETION DEPTH: 61.0 m | COMPLETION DATE: 9/15/06

City of Quesnel	Observation Well Installation	TEST HOLE NO: BH6
Quesnel, B.C.	Sanitary Landfill	PROJECT NO: K002587
Air Rotary Drill Rig	North Side of Landfill	ELEVATION:

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

DEPTH (m)	PLASTIC / W.C. / LIQUID (20 40 60 80)	INSTRUMENTATION DATA	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION	DEPTH (ft)
0.0				FILL, wood debris, sandy, some silt				0.0
1.0								3.0
2.0								4.5
3.0								6.0
4.0								7.5
5.0				GRAVEL, trace sand, dry				9.0
6.0								10.5
7.0				CLAY, silty, grey				12.0
8.0				CLAY, silty, trace fine sand, brown, dry				13.5
9.0				END of hole @ 7.6 m				15.0
10.0				Borehole was dry upon completion				16.5
11.0				No monitoring well installed, backfilled				18.0
12.0				with drill cuttings				19.5
13.0								21.0
14.0								22.5
15.0								24.0
16.0								25.5
17.0								27.0
18.0								28.5
19.0								30.0
20.0								31.5
21.0								33.0
22.0								34.5
23.0								36.0
24.0								37.5
25.0								39.0
26.0								40.5
27.0								42.0
28.0								43.5
29.0								45.0
30.0								46.5
								48.0
								49.5
								51.0
								52.5
								54.0
								55.5
								57.0
								58.5
								60.0
								61.5
								63.0
								64.5
								66.0
								67.5
								69.0
								70.5
								72.0
								73.5
								75.0
								76.5
								78.0
								79.5
								81.0
								82.5
								84.0
								85.5
								87.0
								88.5
								90.0
								91.5
								93.0
								94.5
								96.0
								97.5
								99.0

AGRA Earth & Environmental Limited
Prince George, B.C.

LOGGED BY: BAN | COMPLETION DEPTH: 7.6 m
REVIEWED BY: WCW | COMPLETE: 17/06/96
Fig. No: 7 | Page 1 of 1

City of Quesnel	Observation Well Installation	TEST HOLE NO: OW6
Quesnel, B.C.	Sanitary Landfill	PROJECT NO: 10022587
Air Rotary Drill Rig	Northwest Corner of Landfill	ELEVATION: 27.66 (m)

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

DEPTH (m)	PLASTIC / W.C. / LIQUID (20 40 60 80)	WELL INSTALLATION	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION	DEPTH (m)
0.0				SAND, gravelly				0.0
1.0				FILL, wood debris, sandy				2.0
2.0								4.0
3.0								6.0
4.0								8.0
5.0				SAND & GRAVEL, silty, grey, dry				10.0
6.0				SAND & GRAVEL, clean, dry				12.0
7.0				GRAVEL, sandy, dry				14.0
8.0				SAND & GRAVEL, grey, moist				16.0
9.0 ▼				– wet				18.0
10.0								20.0
11.0								22.0
12.0								24.0
13.0								26.0
14.0								28.0
15.0								30.0
16.0								32.0
17.0								34.0
18.0								36.0
19.0								38.0
20.0				– occasional clay lenses				40.0
21.0								42.0
22.0				CLAY, trace gravel, grey, wet				44.0
23.0				END of hole @ 21.6 m				46.0
24.0				Monitoring well installed				48.0
25.0				Water level at 8.88 m one day after drilling				50.0
26.0								52.0
27.0								54.0
28.0								56.0
29.0								58.0
30.0								60.0

AGRA Earth & Environmental Limited
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LOGGED BY: BAN
REVIEWED BY: WCW
File No: 3

COMPLETION DEPTH: 21.6 m
COMPLETE: 17/06/96

City of Quesnel	Observation Well Installation	TEST HOLE NO: OW7
Quesnel, B.C.	Sanitary Landfill	PROJECT NO: 10202587
Air Rotary Drill Rig	West Side of the Landfill	ELEVATION: 30.82 (m)

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

DEPTH (m)	PLASTIC / MOIST / LIQUID	WELL INSTALLATION	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION	DEPTH (m)
0.0				TOPSOIL				
1.0				SAND & GRAVEL, well graded, brown, dry				
2.0								
3.0								
4.0								
5.0								
6.0				– moist				
7.0								
8.0								
9.0								
10.0								
11.0				– wet				
12.0								
13.0								
14.0								
15.0				SAND, trace gravel, medium, well graded, brown, wet				
16.0								
17.0								
18.0				SAND, gravelly, brown, wet				
19.0								
20.0				GRAVEL, sandy, wet				
21.0								
22.0								
23.0				CLAY, trace gravel, grey				
24.0				END of hole @ 23.5 m Monitoring well installed Water level at 11.89 m one day after drilling.				
25.0								
26.0								
27.0								
28.0								
29.0								
30.0								

AGRA Earth & Environmental Limited
Prince George, B.C.

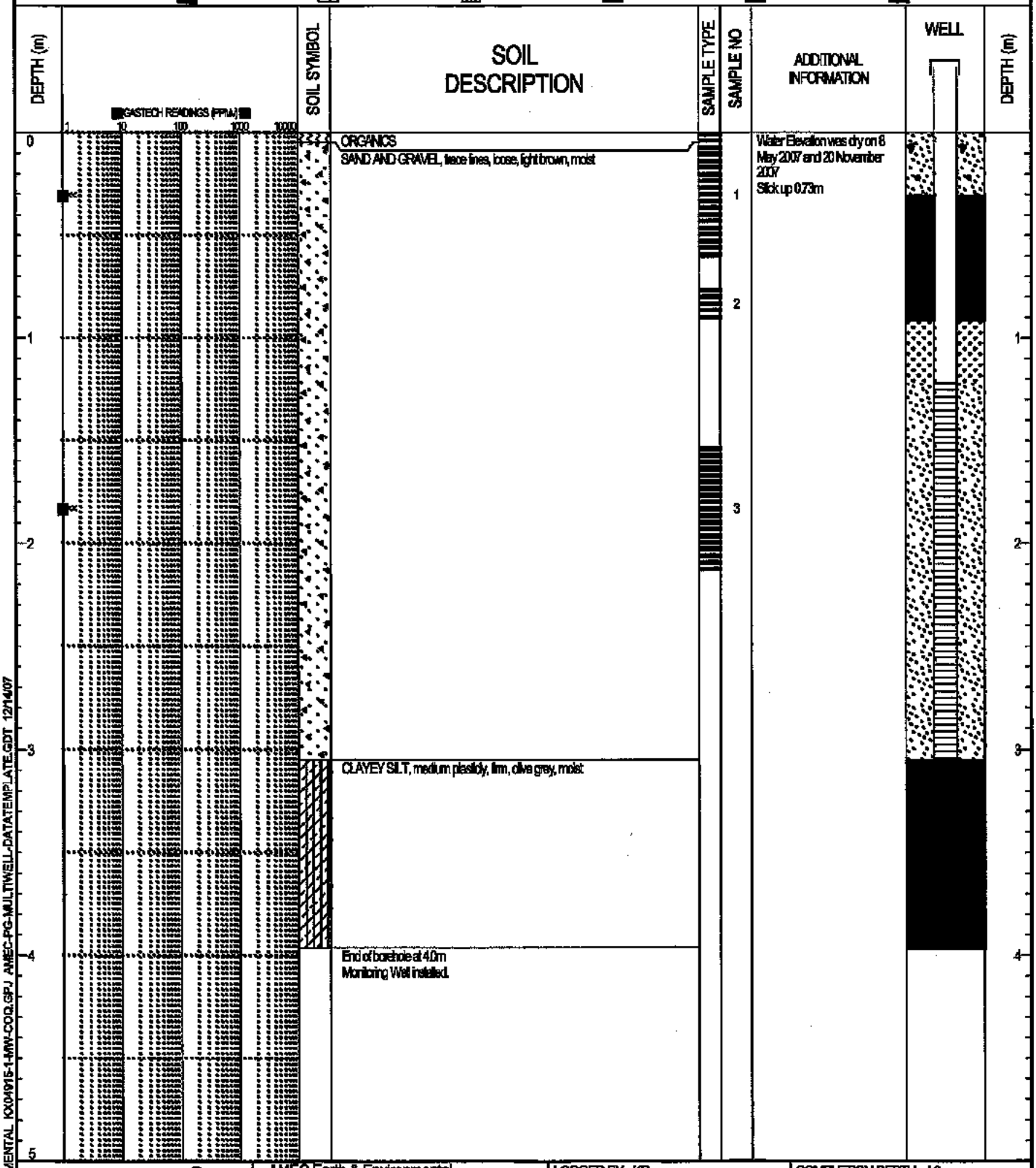
LOGGED BY: BAN
REVIEWED BY: WCW
Fig. No: 4

COMPLETION DEPTH: 23.5 m
COMPLETE: 18/06/96

CLIENT: City of Quesnel	PROJECT: City of Quesnel Landfill	BOREHOLE NO: MW07-11
DRILLER: Geotech Drilling	Quesnel, BC	PROJECT NO: KX04915-1
DRILL TYPE/METHOD: Deep Rock/ODEX		ELEVATION:

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND



AMEC Earth & Environmental
3456 Ople Crescent
Prince George, British Columbia
Canada V2N 2P9

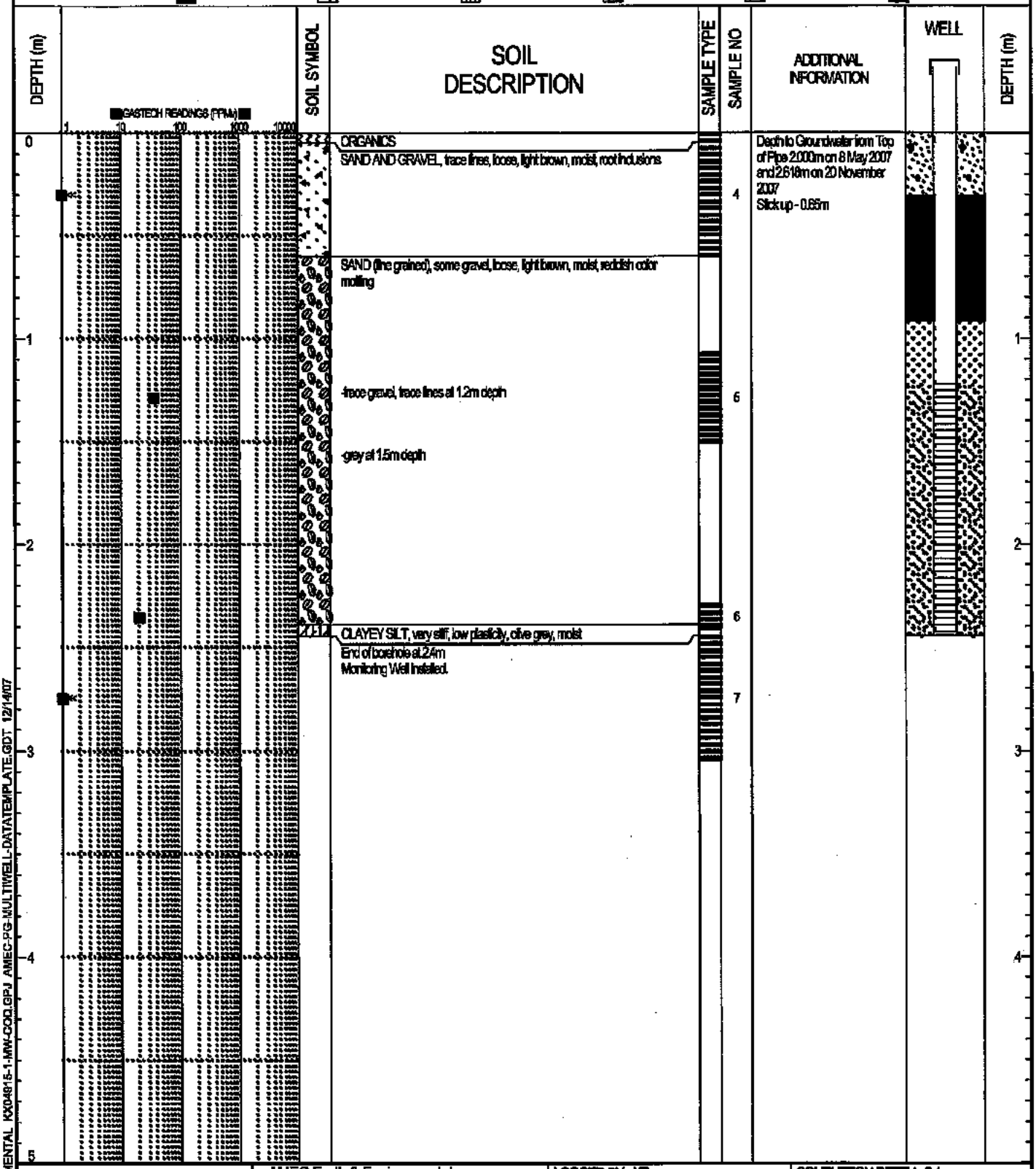
LOGGED BY: KR	COMPLETION DEPTH: 4.0 m
ENTERED BY: SR	COMPLETION DATE: 4/20/07
REVIEWED BY:	Page 1 of 1

ENVIRONMENTAL KX04915-1-MW-COQ.GPJ AMEC-PG-MULTIWELL-DATATEMPLATE.GDT 12/14/07

CLIENT: City of Quesnel	PROJECT: City of Quesnel Landfill	BOREHOLE NO: MW07-12
DRILLER: Geotech Drilling	Quesnel, BC	PROJECT NO: K/04915-1
DRILL TYPE/METHOD: Deep Rock/ODEX		ELEVATION:

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND



ENVIRONMENTAL K/04915-1-MW-COD.GPJ AMEC-PG-MULTIWELL-DATATEMPLATE.GDT 12/14/07

amec	AMEC Earth & Environmental 3456 Ople Crescent Prince George, British Columbia Canada V2N 2P9	LOGGED BY: KR	COMPLETION DEPTH: 2.4 m
		ENTERED BY: SR	COMPLETION DATE: 4/20/07
		REVIEWED BY:	Page 1 of 1

CLIENT: City of Quesnel	PROJECT: Annual Groundwater Monitoring Report	BOREHOLE NO: MW08-6d
DRILLER: Geotech Drilling	Quesnel Landfill, Quesnel, BC	PROJECT NO: KX05013
DRILL TYPE/METHOD: B53/ODEX	NORTHING: EASTING:	ELEVATION:

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION	MONITORING WELL	DEPTH (m)
0		SANDY ORGANIC SOIL with gravel, brown, wet, root inclusions					0
1		GRAVEL with sand, poorly-graded, trace silt, loose, brown, wet					1
2							2
3		-medium dense, light brown, small gravel					3
4							4
5		SAND with gravel, well-graded, dense, light brown, dry					5
6							6
7							7
8		GRAVEL with sand, well-graded, dense, light brown, dry					8
9		-very dense, dry					9
10							10
11		SAND with gravel, well-graded, trace fine sand, very dense, light brown, dry					11
12							12
13		GRAVEL with sand, well-graded, dense, light brown, dry					13
14		SAND with trace gravel, well-graded, very dense, light brown, dry					14
15		GRAVEL with sand, well-graded, dense, light brown, dry					15
16							16
17		-wet					17
18							18
19		SILT with gravel, sandy, trace clay, grey-brown, dense, wet					19
20							20
21							21
22		CLAY, trace sand, very stiff to hard, high plasticity, massive bedding, moist					22
23							23
24							24
25							25
26							26
27							27
28							28
29							29
30							30
31		SAND with gravel, well-graded, medium dense, brown, damp					31
32		CLAY lense, thickly bedded, grey, damp					32
33		SAND with gravel, well-graded, medium dense, brown, damp -cobble					33
34							34
35		CLAY with sand, bedded, stiff, moist, brown					35
36		SAND with silt, fine-grained, grey-brown, dense, moist					36
37							37
38							38
39							39
40							

BOREHOLE LOG KX05013-BHLOG.GPJ AMEC PG.GDT 2/3/09

amec
AMEC Earth & Environmental
913 Laval Crescent
Kamloops, British Columbia
Canada V2C 5P4

LOGGED BY: JR	COMPLETION DEPTH: 66.1 m
ENTERED BY: IM	COMPLETION DATE: 10/24/08
Fig. No: KX05013	Page 1 of 2

CLIENT: City of Quesnel	PROJECT: Annual Groundwater Monitoring Report	BOREHOLE NO: MW08-8d
DRILLER: Geotech Drilling	Quesnel Landfill, Quesnel, BC	PROJECT NO: KX05013
DRILL TYPE/METHOD: B53/ODEX	NORTHING: EASTING:	ELEVATION:

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION	MONITORING WELL	DEPTH (m)
40		SAND with silt, fine-grained, grey-brown, dense, moist *(continued)*					40
41							41
42							42
43							43
44							44
45							45
46							46
47							47
48							48
49		-trace gravel					49
50							50
51							51
52							52
53							53
54							54
55							55
56							56
57							57
58							58
59							59
60		-moist to wet					60
61							61
62							62
63							63
64							64
65							65
66							66
67							67
68							68
69							69
70							70
71							71
72							72
73							73
74							74
75							75
76							76
77							77
78							78
79							79
80							

amec
AMEC Earth & Environmental
913 Laval Crescent
Kamloops, British Columbia
Canada V2C 5P4

LOGGED BY: JR	COMPLETION DEPTH: 66.1 m
ENTERED BY: IM	COMPLETION DATE: 10/24/08
Fig. No: KX05013	Page 2 of 2

BOREHOLE LOG KX05013-BH LOG.GPJ AMEC PG.GDT 2/3/09

CLIENT: City of Quesnel	PROJECT: Landfill Monitoring Program	BOREHOLE NO: MW05-4
DRILLER: Geotech Drilling	Quesnel, BC	PROJECT NO: KX04701
DRILL TYPE/METHOD: B-80/Odex		ELEVATION:

SAMPLE TYPE: TUBE / NO RECOVERY / SPLIT SPOON / GRAB / MUD RETURN / CORE RETURN

BACKFILL TYPE: BENTONITE / PEA GRAVEL / SLOUGH / GROUT / DRILL CUTTINGS / SAND

DEPTH (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION
0	SILTY SAND (fine grained), trace coarse grained sand, compact, light brown, moist			Depth of Groundwater from Top of Pipe 11.82m on 24 Nov 2005 Stick up - 0.75m
~0.9	SAND AND GRAVEL, trace silt, 60% to 70% rounded gravel, compact, medium brown, damp			
~4.5	SAND (fine grained), trace silt, trace clay, compact, medium brown, moist			
	-and gravel			
	-trace cobbles and boulder			
	-sand and gravel, through boulder			
11				Water Level observed at 11.1m
	-wet			
	-silty sand and gravel			
~15.2	SILTY CLAY, very firm, low to medium plastic, medium brown, moist			
15.8	End of Hole at 15.8 m. Monitoring Well Installed.			

AMEC Earth & Environmental
610 Richard Road
Prince George, British Columbia
Canada V2K 4L3

LOGGED BY: RH	COMPLETION DEPTH: 15.8 m
ENTERED BY: BR	COMPLETION DATE: 8/18/05
REVIEWED BY:	

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 18278 Owner: L SWORD Address: Area: WELL LOCATION: CARIBOO Land District District Lot: 7263 Plan: Lot: Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island: BCGS Number (NAD 27): 093B098434 Well: 1 Class of Well: Subclass of Well: Orientation of Well: Status of Well: New Well Use: Private Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 8.0 inches Casing drive shoe: Well Depth: 52 feet Elevation: 0 feet (ASL) Final Casing Stick Up: inches Well Cap Type: Bedrock Depth: feet Lithology Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Site Info Details: Other Info Flag: Other Info Details:	Construction Date: 1963-11-01 00:00:00.0 Driller: Western Water Wells Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 20 (Driller's Estimate) Gallons per Minute (U.S./Imperial) Development Method: Pump Test Info Flag: Artesian Flow: Artesian Pressure (ft): Static Level: 37 feet WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Water Utility: Water Supply System Name: Water Supply System Well Name: SURFACE SEAL: Flag: Material: Method: Depth (ft): Thickness (in): WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe
null	null	null	null	null

GENERAL REMARKS:

LITHOLOGY INFORMATION:
From 0 to 47 Ft. fine to coarse sand and gravel
From 47 to 52 Ft. fine to coarse sand and gravel (w.b.)

- Return to Main
- Return to Search Options
- Return to Search Criteria

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 20888 Owner: SCHOOL DIST NO 28 Address: Area: WELL LOCATION: CARIBOO Land District District Lot: 6683 Plan: Lot: Township: Section: Range: Indian Reserve: Meridian: Block: A Quarter: Island: BCGS Number (NAD 27): 093B098434 Well: 3 Class of Well: Subclass of Well: Orientation of Well: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Casing drive shoe: Well Depth: 208 feet Elevation: 0 feet (ASL) Final Casing Stick Up: inches Well Cap Type: Bedrock Depth: feet Lithology Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Site Info Details: Other Info Flag: Other Info Details:	Construction Date: 1967-09-01 00:00:00.0 Driller: Quesnel Water Wells Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 1000 (Driller's Estimate) Gallons per Hour (U.S./Imperial) Development Method: Pump Test Info Flag: Artesian Flow: Artesian Pressure (ft): Static Level: 176 feet WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Water Utility: Water Supply System Name: Water Supply System Well Name: SURFACE SEAL: Flag: Material: Method: Depth (ft): Thickness (in): WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe
null	null	null	null	null

GENERAL REMARKS:

LITHOLOGY INFORMATION:

From	0 to	14 Ft.	gravel
From	14 to	85 Ft.	soft clay
From	85 to	120 Ft.	sand and silt
From	120 to	145 Ft.	sand and gravel
From	145 to	195 Ft.	fine sand
From	195 to	197 Ft.	fine gravel
From	197 to	208 Ft.	sand and gravel

- Return to Main
- Return to Search Options
- Return to Search Criteria

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 21436 Owner: R E GOOK Address: CARIBOO HWY Area: WELL LOCATION: CARIBOO Land District District Lot: 6682 Plan: Lot: Township: Section: Range: Indian Reserve: Meridian: Block: A Quarter: Island: BCGS Number (NAD 27): 093B098434 Well: 2 Class of Well: Subclass of Well: Orientation of Well: Status of Well: New Well Use: Private Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Casing drive shoe: Well Depth: 536 feet Elevation: 0 feet (ASL) Final Casing Stick Up: inches Well Cap Type: Bedrock Depth: feet Lithology Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Site Info Details: Other Info Flag: Other Info Details:	Construction Date: 1968-05-01 00:00:00.0 Driller: Quesnel Water Wells Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 200 (Driller's Estimate) Gallons per Hour (U.S./Imperial) Development Method: Pump Test Info Flag: Artesian Flow: Artesian Pressure (ft): Static Level: 497 feet WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Water Utility: Water Supply System Name: Water Supply System Well Name: SURFACE SEAL: Flag: Material: Method: Depth (ft): Thickness (in): WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe
null	null	null	null	null

GENERAL REMARKS:

LITHOLOGY INFORMATION:

From	0	to	40	Ft. soft clay
From	40	to	55	Ft. glacial clay
From	55	to	60	Ft. gravel
From	60	to	169	Ft. clay
From	169	to	171	Ft. gravel
From	171	to	247	Ft. silt and clay
From	247	to	383	Ft. silt and clay
From	383	to	422	Ft. clay
From	422	to	446	Ft. sand and clay
From	446	to	510	Ft. sand and gravel
From	510	to	520	Ft. coarse sand
From	520	to	523	Ft. gravel
From	523	to	528	Ft. coarse sand
From	528	to	536	Ft. gravel

- Return to Main
- Return to Search Options
- Return to Search Criteria

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 22910 Owner: SWORD Address: Area: WELL LOCATION: CARIBOO Land District District Lot: 7263 Plan: Lot: Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island: BCGS Number (NAD 27): 093B098434 Well: 4 Class of Well: Subclass of Well: Orientation of Well: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 4.5 inches Casing drive shoe: Well Depth: 240 feet Elevation: 0 feet (ASL) Final Casing Stick Up: inches Well Cap Type: Bedrock Depth: feet Lithology Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Site Info Details: Other Info Flag: Other Info Details:	Construction Date: 1969-10-17 00:00:00.0 Driller: Manville Drilling Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 7 (Driller's Estimate) Gallons per Minute (U.S./Imperial) Development Method: Pump Test Info Flag: Artesian Flow: Artesian Pressure (ft): Static Level: 186 feet WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Water Utility: Water Supply System Name: Water Supply System Well Name: SURFACE SEAL: Flag: Material: Method: Depth (ft): Thickness (in): WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe
null	null	null	null	null

GENERAL REMARKS:

LITHOLOGY INFORMATION:

From	0 to	4 Ft.	clay
From	4 to	12 Ft.	gravel
From	12 to	15 Ft.	clay
From	15 to	38 Ft.	gravel and boulders
From	38 to	49 Ft.	clay
From	49 to	55 Ft.	sand
From	55 to	180 Ft.	clay small layers of sand
From	180 to	240 Ft.	sand and gravel

- Return to Main
- Return to Search Options
- Return to Search Criteria

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 23824	Construction Date: 1970-08-01 00:00:00.0
Owner: CARIBOO PULP & PAPER	Driller: Quesnel Water Wells Well Identification Plate Number:
Address: MILL SITE	Plate Attached By: Where Plate Attached:
Area: QUESNEL	PRODUCTION DATA AT TIME OF DRILLING:
WELL LOCATION: CARIBOO Land District District Lot: 77 Plan: Lot: Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island: BCGS Number (NAD 27): 093B098433 Well: 13	Well Yield: 0 (Driller's Estimate) Development Method: Pump Test Info Flag: Artesian Flow: Artesian Pressure (ft): Static Level:
Class of Well: Subclass of Well: Orientation of Well: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Casing drive shoe: Well Depth: 60 feet Elevation: 0 feet (ASL) Final Casing Stick Up: inches Well Cap Type: Bedrock Depth: feet Lithology Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Site Info Details: Other Info Flag: Other Info Details:	WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Water Utility: Water Supply System Name: Water Supply System Well Name: SURFACE SEAL: Flag: Material: Method: Depth (ft): Thickness (in): WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe

GENERAL REMARKS:

LITHOLOGY INFORMATION:

From	0 to	3 Ft.	sand
From	3 to	27 Ft.	gravel
From	27 to	29 Ft.	clay gravel
From	29 to	38 Ft.	silt

From	38	to	48 Ft.	clay
From	48	to	60 Ft.	sand clay layers

- Return to Main
- Return to Search Options
- Return to Search Criteria

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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 23825	Construction Date: 1970-08-01 00:00:00.0
Owner: CARIBOO PULP & PAPER	Driller: Quesnel Water Wells Well Identification Plate Number: Plate Attached By: Where Plate Attached:
Address: MILL SITE	
Area: QUESNEL	PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 600 (Driller's Estimate) Gallons per Hour (U.S./Imperial)
WELL LOCATION: CARIBOO Land District District Lot: 77 Plan: Lot: Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island: BCGS Number (NAD 27): 093B098433 Well: 15	Development Method: Pump Test Info Flag: Artesian Flow: Artesian Pressure (ft): Static Level: 16 feet WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM):
Class of Well: Subclass of Well: Orientation of Well: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Casing drive shoe: Well Depth: 42 feet Elevation: 0 feet (ASL) Final Casing Stick Up: inches Well Cap Type: Bedrock Depth: feet Lithology Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Site Info Details: Other Info Flag: Other Info Details:	Water Utility: Water Supply System Name: Water Supply System Well Name: SURFACE SEAL: Flag: Material: Method: Depth (ft): Thickness (in): WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe

GENERAL REMARKS:

LITHOLOGY INFORMATION:

From	0 to	10 Ft.	sand
From	10 to	18 Ft.	gravel
From	18 to	37 Ft.	glacial clay
From	37 to	42 Ft.	gravel loose w.b. gravel at 42 ft

- Return to Main
- Return to Search Options
- Return to Search Criteria

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 23826

Owner: CARIBOO PULP & PAPER

Address:

Area: QUESNEL

WELL LOCATION:
CARIBOO Land District
District Lot: 78 Plan: Lot:
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island:
BCGS Number (NAD 27): 093G008211 Well: 7

Class of Well:
Subclass of Well:
Orientation of Well:
Status of Well: New
Well Use: Unknown Well Use
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 0.0 inches
Casing drive shoe:
Well Depth: 65 feet
Elevation: 0 feet (ASL)
Final Casing Stick Up: inches
Well Cap Type:
Bedrock Depth: feet
Lithology Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag:

Site Info Details:
Other Info Flag:
Other Info Details:

Construction Date: 1970-08-01 00:00:00.0

Driller: Quesnel Water Wells
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 0 (Driller's Estimate)
Development Method:
Pump Test Info Flag:
Artesian Flow:
Artesian Pressure (ft):
Static Level:

WATER QUALITY:
Character:
Colour:
Odour:
Well Disinfected: N
EMS ID:
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

SURFACE SEAL:
Flag:
Material:
Method:
Depth (ft):
Thickness (in):

WELL CLOSURE INFORMATION:
Reason For Closure:
Method of Closure:
Closure Sealant Material:
Closure Backfill Material:
Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe

GENERAL REMARKS:

LITHOLOGY INFORMATION:

From	0 to	8 Ft.	sand
From	8 to	16 Ft.	coarse gravel
From	16 to	18 Ft.	fine gravel

From	18	to	20 Ft.	fine gravel
From	20	to	23 Ft.	sand
From	23	to	25 Ft.	sand and clay
From	25	to	49 Ft.	rocky clay
From	49	to	55 Ft.	sandy clay
From	55	to	65 Ft.	clay

- Return to Main
- Return to Search Options
- Return to Search Criteria

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 23828

Owner: CARIBOO PULP & PAPER

Address: MILL SITE

Area: QUESNEL

WELL LOCATION:
CARIBOO Land District
District Lot: 77 Plan: Lot:
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island:
BCGS Number (NAD 27): 093B098433 Well: 14

Class of Well:
Subclass of Well:
Orientation of Well:
Status of Well: New
Well Use: Unknown Well Use
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 6.0 inches
Casing drive shoe:
Well Depth: 60 feet
Elevation: 0 feet (ASL)
Final Casing Stick Up: inches
Well Cap Type:
Bedrock Depth: feet
Lithology Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag:

Site Info Details:
Other Info Flag:
Other Info Details:

Construction Date: 1970-08-01 00:00:00.0

Driller: Quesnel Water Wells
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 0 (Driller's Estimate)
Development Method:
Pump Test Info Flag:
Artesian Flow:
Artesian Pressure (ft):
Static Level:

WATER QUALITY:
Character:
Colour:
Odour:
Well Disinfected: N
EMS ID:
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

SURFACE SEAL:
Flag:
Material:
Method:
Depth (ft):
Thickness (in):

WELL CLOSURE INFORMATION:
Reason For Closure:
Method of Closure:
Closure Sealant Material:
Closure Backfill Material:
Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe

GENERAL REMARKS:

LITHOLOGY INFORMATION:

From	0 to	1 Ft.	sand
From	1 to	18 Ft.	coarse gravel
From	18 to	19 Ft.	coarse gravel
From	19 to	38 Ft.	fine and coarse gravel mixed

From 38 to 39 Ft. gravelly clay From 39 to 60 Ft. clay

- Return to Main
- Return to Search Options
- Return to Search Criteria

Information Disclaimer

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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 23829

Owner: CARIBOO PULP & PAPER

Address:

Area: QUESNEL

WELL LOCATION:
CARIBOO Land District
District Lot: 78 Plan: Lot:
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island:
BCGS Number (NAD 27): 093G008211 Well: 8

Class of Well:
Subclass of Well:
Orientation of Well:
Status of Well: New
Well Use: Unknown Well Use
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 0.0 inches
Casing drive shoe:
Well Depth: 57 feet
Elevation: 0 feet (ASL)
Final Casing Stick Up: inches
Well Cap Type:
Bedrock Depth: feet
Lithology Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag:

Site Info Details:
Other Info Flag:
Other Info Details:

Construction Date: 1970-08-01 00:00:00.0

Driller: Quesnel Water Wells
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 0 (Driller's Estimate)
Development Method:
Pump Test Info Flag:
Artesian Flow:
Artesian Pressure (ft):
Static Level: 52 feet

WATER QUALITY:
Character:
Colour:
Odour:
Well Disinfected: N
EMS ID:
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

SURFACE SEAL:
Flag:
Material:
Method:
Depth (ft):
Thickness (in):

WELL CLOSURE INFORMATION:
Reason For Closure:
Method of Closure:
Closure Sealant Material:
Closure Backfill Material:
Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe

GENERAL REMARKS:

LITHOLOGY INFORMATION:

From	0 to	2 Ft.	sand
From	2 to	10 Ft.	coarse gravel
From	10 to	20 Ft.	loose fine gravel

From	20	to	28 Ft.	fine gravel
From	28	to	30 Ft.	light fine gravel
From	30	to	34 Ft.	coarse gravel
From	34	to	45 Ft.	fine gravel
From	45	to	46 Ft.	hard gravel
From	46	to	49 Ft.	fine loose gravel
From	49	to	50 Ft.	clay chunks
From	50	to	57 Ft.	water bearing

- Return to Main
- Return to Search Options
- Return to Search Criteria

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 72812

Owner: GOOK RICHARD

Address: RICHARD'S ROAD

Area: QUESNEL

WELL LOCATION:
CARIBOO Land District
District Lot: 6682 Plan: PGP 44141 Lot: 3
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island:
BCGS Number (NAD 27): 093B098434 Well: 5

Class of Well:
Subclass of Well:
Orientation of Well:
Status of Well: New
Well Use:
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 6.0 inches
Casing drive shoe:
Well Depth: 66 feet
Elevation: 0 feet (ASL)
Final Casing Stick Up: inches
Well Cap Type:
Bedrock Depth: feet
Lithology Info Flag: N
File Info Flag: N
Sieve Info Flag: N
Screen Info Flag: N

Site Info Details:
Other Info Flag:
Other Info Details:

Construction Date: 1973-05-21 00:00:00.0

Driller: Brinkman Drilling
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 0 (Driller's Estimate)
Development Method:
Pump Test Info Flag: Y
Artesian Flow:
Artesian Pressure (ft):
Static Level: 8 feet

WATER QUALITY:
Character:
Colour:
Odour:
Well Disinfected: N
EMS ID:
Water Chemistry Info Flag: N
Field Chemistry Info Flag:
Site Info (SEAM):

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

SURFACE SEAL:
Flag: N
Material:
Method:
Depth (ft):
Thickness (in):

WELL CLOSURE INFORMATION:
Reason For Closure:
Method of Closure:
Closure Sealant Material:
Closure Backfill Material:
Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe

GENERAL REMARKS:
CASING 0.0 TO 65.0, PUMP TEST RATE 200 GPH,

LITHOLOGY INFORMATION:

From	0	to	30 Ft.	BROWN CLAY
From	65	to	66 Ft.	GRAVEL & SAND
From	55	to	64 Ft.	ROCKY CLAY
From	30	to	55 Ft.	GRAVEL

- Return to Main
- Return to Search Options
- Return to Search Criteria

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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 89651 Owner: CARIBOO PULP & PAPER Address: 600 NORTH STAR ROAD Area: QUESNEL WELL LOCATION: CARIBOO Land District District Lot: 7264 Plan: 32686 Lot: Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island: BCGS Number (NAD 27): 093G008212 Well: 2 Class of Well: Water supply Subclass of Well: Domestic Orientation of Well: Vertical Status of Well: New Well Use: Water Supply System Observation Well Number: Observation Well Status: Construction Method: Diameter: 12 inches Casing drive shoe: Y Well Depth: 205 feet Elevation: feet (ASL) Final Casing Stick Up: inches Well Cap Type: CAP Bedrock Depth: feet Lithology Info Flag: Y File Info Flag: N Sieve Info Flag: N Screen Info Flag: Y Site Info Details: Other Info Flag: Other Info Details:	Construction Date: 1996-09-04 00:00:00.0 Driller: Interior Water Wells Well Identification Plate Number: 19188 Plate Attached By: BRUCE STEELE Where Plate Attached: SURFACE ACCESS (MANHOLE PLATE) PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 1000 (Driller's Estimate) U.S. Gallons per Minute Development Method: Surging Pump Test Info Flag: N Artesian Flow: Artesian Pressure (ft): Static Level: 96 feet WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: N Field Chemistry Info Flag: Site Info (SEAM): N Water Utility: N Water Supply System Name: POTABLE WATER Water Supply System Well Name: CARIBOO PULP EQUIPMENT #271-064 SURFACE SEAL: Flag: N Material: Method: Depth (ft): Thickness (in): WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:

Screen from	to feet	Type	Slot Size
184	205		.2

Casing from	to feet	Diameter	Material	Drive Shoe
0	184	12	Steel	Y

GENERAL REMARKS:

LITHOLOGY INFORMATION:

From	0 to	15 Ft.	GRAVEL BOULDERS (FILL)
From	15 to	96 Ft.	SILTY SAND
From	96 to	154 Ft.	COARSE GRAVEL, WATER
From	154 to	165 Ft.	COARSE GRAVEL, DIRTY
From	165 to	173 Ft.	COARSE GRAVEL, LOOSE
From	173 to	185 Ft.	COARSE GRAVEL, TIGHT DIRTY
From	185 to	212 Ft.	COARSE SAND & GRAVEL LOOSE WATER

- Return to Main
- Return to Search Options
- Return to Search Criteria

Quesnel Landfill

Legend

- Commercial and Industrial Well Use
- Domestic Well Use

Water - River, Canal, etc. - Colour Themed (1:20,000)

- Canal
- River or Stream - Definite

Water - River, Canal, etc. - Outlined (1:20,000)

- Canal
- River or Stream - Definite

Water - Lake, Reservoir, etc. - Colour Themed (1:20,000)

- Mine - Tailing Pond
- Lake - Definite
- Reservoir - Definite

Water - Lake, Reservoir, etc. - Outlined (1:20,000)

- Mine - Tailing Pond
- Lake - Definite
- Reservoir - Definite

Water - Wetlands - Colour Themed (1:20,000)

- Flooded Land - Inundated
- Marsh
- Swamp

Water - Wetlands - Outlined (1:20,000)

- Flooded Land - Inundated
- Marsh

0 125 250 m.

Scale 1:8,925

Datum/Projection: NAD83, Albers Equal Area Conic

Key Map of British Columbia

Environmental Monitoring System
Historical Statistics Report

Selection Criteria

EMS ID:	E222770
Region:	
Permit ID:	
Office:	
Establishing Agency:	
Location Type:	
Monitoring Group:	
Collection Start Date/Time From	1950-01-01 00:00
Collection Start Date/Time To:	2010-06-01 23:59
Specific Month:	
Sample State:	
Sample Descriptor:	
Study:	
Parameter Code:	
Data Index:	
QA Index:	
Watershed:	
Eco Region:	

Order by

Office Code:	Y
Parameter Code:	Y
Location Type:	N
Sample State Code:	N

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: E222770 **Name:** QUESNEL LF (PR 3132) CEMENT PLANT **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 20
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1990-04-19
Watershed Code: **Most Recent Collection Date:** 2001-10-24
Latitude: 052:59:42 **Longitude:** 122:28:30

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	0004	pH	pH units	8.19000		7.06000	7.61200	7.61000	0.32431	2001-10-24	20	20
FW	GE	0007	Residue: Filterable 1.0u	mg/L	702.00000		144.00000	328.65000	251.00000	190.03276	2001-10-24	20	20
FW	GE	0011	Specific Conductance	uS/cm	2570.00000		0.27000	665.22710	408.50000	608.20323	2001-10-24	20	20
FW	GE	0102	Alkalinity Total 4.5	mg/L	157.00000		122.00000	143.00000	146.50000	15.76917	2001-10-24	4	4
FW	GE	0103	Carbon Total Organic	mg/L	5.00000	<	0.05000	2.72538	1.00000	1.56882	2001-10-24	18	13
FW	GE	0104	Chloride Total	mg/L	83.10000	<	0.50000	37.49300	36.90000	23.98581	1997-10-23	13	10
FW	GE	0107	Hardness Total (Total)	mg/L	494.00000		126.00000	256.40000	165.00000	147.32256	2001-10-24	20	20
FW	GE	0108	Nitrogen Amm.Total	mg/L	1.00000	<	0.00500	0.16400	0.00500	0.10900	2001-07-19	18	5
FW	GE	0110	Nitrogen NO3 Total	mg/L	2.45000		0.02900	0.79956	0.50400	0.84862	2001-10-24	20	16
FW	GE	0111	Nitrogen NO2 Total	mg/L	1.00000		0.00000	0.00533	0.00900	0.00425	2001-10-24	20	12
FW	GE	0116	Chemical Oxygen Demand	mg/L	25.00000	<	1.00000	9.60000	20.00000	8.96103	2001-10-24	18	5
FW	GE	0118	Phosphorus Ortho	mg/L	0.01000		0.00700	0.00700	0.01000	0.00000	2001-07-19	3	1
FW	GE	0121	Sulfate Total	mg/L	33.00000		17.30000	24.56923	25.00000	4.81445	1997-10-23	13	13
FW	GE	1104	Chloride Dissolved	mg/L	1.00000	<	0.10000	0.30000	0.40000	0.10000	2001-10-24	7	3
FW	GE	1121	Sulfate Dissolved	mg/L	19.10000		17.00000	18.31429	18.70000	0.82347	2001-10-24	7	7
FW	GE	AL-D	Aluminum Dissolved	mg/L	0.20000	<	0.02000	0.03000	0.02000	0.01414	2001-10-24	5	2
FW	GE	AS-D	Arsenic Dissolved	mg/L	0.20000	<	0.00500		0.00500		2001-10-24	7	0
FW	GE	AS-T	Arsenic Total	mg/L	0.20000		0.00050	0.00143	0.20000	0.00137	1997-10-23	13	3
FW	GE	B--D	Boron Dissolved	mg/L	0.10000	<	0.10000	0.10000	0.10000	0.00000	2001-10-24	5	1
FW	GE	BA-D	Barium Dissolved	mg/L	0.15400		0.06000	0.09480	0.07000	0.04410	2001-10-24	5	5
FW	GE	CA-D	Calcium Dissolved	mg/L	44.00000		30.80000	38.64000	39.90000	5.33038	2001-10-24	5	5
FW	GE	CD-D	Cadmium Dissolved	mg/L	0.01000	<	0.00100		0.00100		2001-10-24	7	0
FW	GE	CD-T	Cadmium Total	mg/L	0.01000	<	0.00020	0.00100	0.01000	0.00000	1997-10-23	13	1
FW	GE	CR-D	Chromium Dissolved	mg/L	0.01000	<	0.00100		0.00100		2001-10-24	7	0
FW	GE	CR-T	Chromium Total	mg/L	0.01500	<	0.00100	0.00400	0.01000	0.00000	1997-10-23	13	1
FW	GE	CU-D	Copper Dissolved	mg/L	0.01000	<	0.00200	0.00900	0.00900	0.00000	2001-10-24	7	1
FW	GE	CU-T	Copper Total	mg/L	0.07000	<	0.00100		0.01000		1997-10-23	13	0
FW	GE	FE-D	Iron Dissolved	mg/L	0.05000		0.00500	0.02833	0.03000	0.02255	2001-10-24	7	3
FW	GE	FE-T	Iron Total	mg/L	3.00000	<	0.02000	0.12800	0.03000	0.05118	1997-10-23	13	3
FW	GE	K--D	Potassium Dissolved	mg/L	1.00000		0.60000	0.73333	0.60000	0.23094	2001-10-24	3	3

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: E222770 **Name:** QUESNEL LF (PR 3132) CEMENT PLANT **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 20
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1990-04-19
Watershed Code: **Most Recent Collection Date:** 2001-10-24
Latitude: 052:59:42 **Longitude:** 122:28:30

State	Sample Desc.	Parameter	Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	K--T Potassium Total	mg/L	0.5		0.5	0.5	0.5	0.0	1999-10-20	1	1
FW	GE	MG-D Magnesium Dissolved	mg/L	10.30000		8.40000	9.20000	8.90000	0.98489	2001-10-24	3	3
FW	GE	MG-T Magnesium Total	mg/L	10.10		10.10	10.10	10.10	0.00	1999-10-20	1	1
FW	GE	MN-D Manganese Dissolved	mg/L	0.04100	<	0.00100	0.03767	0.03900	0.00372	2001-10-24	7	6
FW	GE	MN-T Manganese Total	mg/L	0.06400	<	0.00500	0.02475	0.01100	0.01911	1997-10-23	13	8
FW	GE	MO-D Molybdenum Dissolved	mg/L	0.03000	<	0.00100	0.00200	0.00200	0.00000	2001-10-24	7	3
FW	GE	MO-T Molybdenum Total	mg/L	0.03000	<	0.00100	0.00500	0.03000	0.00424	1997-10-23	13	2
FW	GE	NA-D Sodium Dissolved	mg/L	5.40000		2.60000	3.74000	3.00000	1.39212	2001-10-24	5	5
FW	GE	PB-D Lead Dissolved	mg/L	0.05000	<	0.00100		0.00100		2001-10-24	7	0
FW	GE	PB-T Lead Total	mg/L	0.05000	<	0.00100	0.00600	0.01000	0.00000	1997-10-23	13	1
FW	GE	SE-D Selenium Dissolved	mg/L	0.20	<	0.01	0.01	0.01	0.00	2001-10-24	5	1
FW	GE	V--D Vanadium Dissolved	mg/L	0.05000	<	0.05000		0.05000		1999-05-20	2	0
FW	GE	ZN-D Zinc Dissolved	mg/L	0.00500	<	0.00200	0.00500	0.00200	0.00000	2001-10-24	7	1
FW	GE	ZN-T Zinc Total	mg/L	0.20000	<	0.00500	0.06283	0.01000	0.07656	1997-10-23	13	6

Outliers are not included, and results less than or greater than
detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Selection Criteria

EMS ID:	0601023
Region:	
Permit ID:	
Office:	
Establishing Agency:	
Location Type:	
Monitoring Group:	
Collection Start Date/Time From	1950-01-01 00:00
Collection Start Date/Time To:	2010-06-01 23:59
Specific Month:	
Sample State:	
Sample Descriptor:	
Study:	
Parameter Code:	
Data Index:	
QA Index:	
Watershed:	
Eco Region:	

Order by

Office Code:	Y
Parameter Code:	Y
Location Type:	N
Sample State Code:	N

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: 0601023 **Name:** QUESNEL LF (PR3132) CONCRETE PLANT MANAGER'S WELL
Location Type: WELL
Office: CARIBOO, WILLIAMS LAKE
No. Samples: 37
Establishing Agency: Cariboo, Williams Lake
First Collection Date: 1975-01-29
Watershed Code:
Most Recent Collection Date: 1985-10-16
Latitude: 052:59:44 **Longitude:** 122:27:47

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	0004	pH	pH units	8.00000		8.00000	8.00000	8.00000	0.00000	1985-10-16	1	1
WW	LE	0004	pH	pH units	8.30000		6.80000	7.50345	7.60000	0.38590	1983-06-08	29	29
WW	LE	0005	Residue: Total (Total So	mg/L	520.00000		382.00000	444.13333	438.00000	36.57842	1980-06-12	15	15
WW	LE	0007	Residue: Filterable 1.0u	mg/L	486.00000		370.00000	435.50000	433.00000	33.85665	1977-12-14	12	12
WW	LE	0008	Residue: Non-filterable	mg/L	1.00000	<	1.00000		1.00000		1979-06-06	1	0
WW	LE	0011	Specific Conductance	uS/cm	920.00000		550.00000	699.96667	702.50000	71.85305	1983-06-08	30	30
FW	GE	0011	Specific Conductance	uS/cm	264.00000		264.00000	264.00000	264.00000	0.00000	1985-10-16	1	1
WW	LE	0013	Temperature	C	24.00000		5.00000	10.10714	9.50000	5.00453	1978-05-25	14	14
WW	LE	0014	Oxygen Dissolved	mg/L	12.00000		5.70000	8.33571	8.45000	1.60701	1978-05-25	14	14
WW	LE	0015	Turbidity	NTU	0.60000		0.10000	0.27692	0.30000	0.14806	1978-05-25	13	13
WW	LE	0024	Color TAC	TAC	1.00000	<	1.00000	1.00000	1.00000	0.00000	1978-05-25	6	3
FW	GE	0101	Alkalinity Phen. 8.3	mg/L	0.5	<	0.5		0.5		1985-10-16	1	0
FW	GE	0102	Alkalinity Total 4.5	mg/L	125.00000		125.00000	125.00000	125.00000	0.00000	1985-10-16	1	1
WW	LE	0102	Alkalinity Total 4.5	mg/L	323.00000		305.00000	313.00000	312.00000	7.51665	1978-05-25	5	5
WW	LE	0103	Carbon Total Organic	mg/L	4.00000	<	1.00000	1.75000	1.00000	1.03510	1983-06-08	14	8
WW	LE	0110	Nitrogen NO3 Total	mg/L	11.50000		2.57000	7.72125	7.55000	3.04967	1983-06-08	8	8
WW	LE	0112	Nitrogen Organic-Total	mg/L	0.06000		0.06000	0.06000	0.06000	0.00000	1983-06-08	1	1
WW	LE	0113	Nitrogen Kjel.Tot(N)	mg/L	0.30000	<	0.01000	0.09364	0.03500	0.09287	1983-06-08	14	11
WW	LE	0114	Nitrogen Total	mg/L	13.21000		2.63000	9.00000	9.75000	2.86176	1983-06-08	14	14
WW	LE	0115	Biochemical Oxygen Deman	mg/L	10.00000	<	10.00000		10.00000		1975-07-15	6	0
FW	GE	0116	Chemical Oxygen Demand	mg/L	10.00000	<	10.00000		10.00000		1985-10-16	1	0
WW	LE	0116	Chemical Oxygen Demand	mg/L	42.60000	<	10.00000	42.60000	10.00000	0.00000	1980-06-12	9	1
FW	GE	0117	Phenols	mg/L	0.004	<	0.004		0.004		1985-10-16	1	0
WW	LE	0117	Phenols	mg/L	0.00400	<	0.00200	0.00350	0.00200	0.00071	1978-05-25	12	2
WW	LE	0124	Carbon Total Inorganic	mg/L	95.00000		70.00000	81.46154	82.00000	7.43433	1983-06-08	13	13
FW	GE	0124	Carbon Total Inorganic	mg/L	31		31	31	31	0	1985-10-16	1	1
WW	LE	0125	Sulfide Total	mg/L	0.50000	<	0.50000		0.50000		1975-07-15	6	0
FW	GE	0131	Acidity pH 8.3	mg/L	2.60000		2.60000	2.60000	2.60000	0.00000	1985-10-16	1	1
FW	GE	0132	Acidity pH 4.5	mg/L	0.5	<	0.5		0.5		1985-10-16	1	0
FW	GE	0450	Coliform - Fecal	MPN	2.00000	<	2.00000		2.00000		1985-10-16	1	0

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: 0601023 **Name:** QUESNEL LF (PR3132) CONCRETE PLANT MANAGER'S WELL
Location Type: WELL
Office: CARIBOO, WILLIAMS LAKE
No. Samples: 37
Establishing Agency: Cariboo, Williams Lake
First Collection Date: 1975-01-29
Watershed Code:
Most Recent Collection Date: 1985-10-16
Latitude: 052:59:44 **Longitude:** 122:27:47

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
WW	LE	0450	Coliform - Fecal	MPN	2.00000	<	2.00000		2.00000		1983-06-08	1	0
FW	GE	0451	Coliform - Total	MPN	2.00000	<	2.00000		2.00000		1985-10-16	1	0
WW	LE	0451	Coliform - Total	MPN	2.00000	<	2.00000		2.00000		1983-06-08	1	0
WW	LE	1104	Chloride Dissolved	mg/L	11.90000		6.40000	8.13333	7.50000	2.10776	1983-06-08	6	6
WW	LE	1107	Hardness Total (Dissolve	mg/L	375.00000		330.00000	358.00000	363.50000	19.54482	1978-05-25	4	4
WW	LE	1108	Nitrogen Ammonia Dissolv	mg/L	0.00500	<	0.00500		0.00500		1983-06-08	1	0
FW	GE	1108	Nitrogen Ammonia Dissolv	mg/L	0.00500		0.00500	0.00500	0.00500	0.00000	1985-10-16	1	1
FW	GE	1109	Nitrate(NO3) + Nitrite(N	mg/L	0.06000		0.06000	0.06000	0.06000	0.00000	1985-10-16	1	1
WW	LE	1109	Nitrate(NO3) + Nitrite(N	mg/L	13.20000		2.57000	8.35500	8.30000	3.07972	1983-06-08	14	14
WW	LE	1110	Nitrate (NO3) Dissolved	mg/L	9.90000		9.70000	9.80000	9.80000	0.14142	1975-11-27	2	2
WW	LE	1111	Nitrogen - Nitrite Disso	mg/L	0.00500	<	0.00500		0.00500		1983-06-08	10	0
FW	GE	1111	Nitrogen - Nitrite Disso	mg/L	0.00500	<	0.00500		0.00500		1985-10-16	1	0
WW	LE	1121	Sulfate Dissolved	mg/L	40.70000		23.00000	28.63333	28.00000	4.27061	1980-06-12	15	15
FW	GE	1121	Sulfate Dissolved	mg/L	19.80000		19.80000	19.80000	19.80000	0.00000	1985-10-16	1	1
FW	GE	AL-T	Aluminum Total	mg/L	0.02	<	0.02		0.02		1985-10-16	1	0
WW	LE	AS-D	Arsenic Dissolved	mg/L	0.00500	<	0.00500		0.00500		1975-04-30	1	0
FW	GE	AS-T	Arsenic Total	mg/L	0.25	<	0.25		0.25		1985-10-16	1	0
FW	GE	C--T	Carbon Total	mg/L	31		31	31	31	0	1985-10-16	1	1
WW	LE	CA-D	Calcium Dissolved	mg/L	111.00000		99.50000	106.16667	108.00000	5.96518	1978-05-25	3	3
FW	GE	CA-T	Calcium Total	mg/L	42.30		42.30	42.30	42.30	0.00	1985-10-16	1	1
FW	GE	CD-T	Cadmium Total	mg/L	0.010	<	0.010		0.010		1985-10-16	1	0
FW	GE	CO-T	Cobalt Total	mg/L	0.100	<	0.100		0.100		1985-10-16	1	0
FW	GE	CR-T	Chromium Total	mg/L	0.010	<	0.010		0.010		1985-10-16	1	0
WW	LE	CU-D	Copper Dissolved	mg/L	0.10000		0.00500	0.03600	0.02000	0.03435	1978-06-01	13	13
WW	LE	CU-T	Copper Total	mg/L	0.00400		0.00400	0.00400	0.00400	0.00000	1978-05-25	1	1
FW	GE	CU-T	Copper Total	mg/L	0.020		0.020	0.020	0.020	0.000	1985-10-16	1	1
WW	LE	FE-D	Iron Dissolved	mg/L	0.10000	<	0.10000	0.10000	0.10000	0.00000	1978-06-01	13	3
WW	LE	FE-T	Iron Total	mg/L	0.10000	<	0.10000		0.10000		1978-05-25	1	0
FW	GE	FE-T	Iron Total	mg/L	0.010		0.010	0.010	0.010	0.000	1985-10-16	1	1
WW	LE	K--D	Potassium Dissolved	mg/L	1.80000		1.80000	1.80000	1.80000	0.00000	1978-05-25	1	1

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: 0601023 **Name:** QUESNEL LF (PR3132) CONCRETE PLANT MANAGER'S WELL
Location Type: WELL
Office: CARIBOO, WILLIAMS LAKE
No. Samples: 37
Establishing Agency: Cariboo, Williams Lake
First Collection Date: 1975-01-29
Watershed Code:
Most Recent Collection Date: 1985-10-16
Latitude: 052:59:44 **Longitude:** 122:27:47

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
WW	LE	MG-D	Magnesium Dissolved	mg/L	22.30000		19.70000	21.00000	21.00000	1.83848	1978-05-25	2	2
FW	GE	MG-T	Magnesium Total	mg/L	10.40		10.40	10.40	10.40	0.00	1985-10-16	1	1
WW	LE	MN-D	Manganese Dissolved	mg/L	0.02000	<	0.02000	0.02000	0.02000	0.00000	1978-06-01	12	1
FW	GE	MN-T	Manganese Total	mg/L	0.01000	<	0.01000		0.01000		1985-10-16	1	0
WW	LE	MN-T	Manganese Total	mg/L	0.02000	<	0.02000		0.02000		1978-05-25	1	0
WW	LE	MO-D	Molybdenum Dissolved	mg/L	0.00140		0.00140	0.00140	0.00140	0.00000	1975-04-30	1	1
FW	GE	MO-T	Molybdenum Total	mg/L	0.01000	<	0.01000		0.01000		1985-10-16	1	0
WW	LE	NA-D	Sodium Dissolved	mg/L	11.10000		9.00000	10.05000	10.05000	1.48492	1983-06-08	2	2
FW	GE	NI-T	Nickel Total	mg/L	0.05000	<	0.05000		0.05000		1985-10-16	1	0
WW	LE	P--D	Phosphorus Total Dissolv	mg/L	0.01000		0.00900	0.00950	0.00950	0.00071	1977-08-25	2	2
WW	LE	P--T	Phosphorus Total	mg/L	0.03100		0.00900	0.01223	0.01000	0.00582	1978-05-25	13	13
WW	LE	PB-D	Lead Dissolved	mg/L	0.00400	<	0.00100	0.00240	0.00100	0.00089	1978-06-01	13	5
WW	LE	PB-T	Lead Total	mg/L	0.00100	<	0.00100		0.00100		1978-05-25	1	0
FW	GE	PB-T	Lead Total	mg/L	0.10	<	0.10		0.10		1985-10-16	1	0
FW	GE	V--T	Vanadium Total	mg/L	0.010	<	0.010		0.010		1985-10-16	1	0
WW	LE	ZN-D	Zinc Dissolved	mg/L	2.00000		0.12000	0.33308	0.20000	0.50255	1978-06-01	13	13
WW	LE	ZN-T	Zinc Total	mg/L	0.15000		0.15000	0.15000	0.15000	0.00000	1978-05-25	1	1
FW	GE	ZN-T	Zinc Total	mg/L	0.010	<	0.010		0.010		1985-10-16	1	0

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Selection Criteria

EMS ID:	0802009
Region:	
Permit ID:	
Office:	
Establishing Agency:	
Location Type:	
Monitoring Group:	
Collection Start Date/Time From	1950-01-01 00:00
Collection Start Date/Time To:	2010-06-01 23:59
Specific Month:	
Sample State:	
Sample Descriptor:	
Study:	
Parameter Code:	
Data Index:	
QA Index:	
Watershed:	
Eco Region:	

Order by

Office Code:	Y
Parameter Code:	Y
Location Type:	N
Sample State Code:	N

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: 0802009 **Name:** QUESNEL LF (PR3132) DW-1, MCKINLEY WELL **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 18
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1984-01-11
Watershed Code: **Most Recent Collection Date:** 1996-04-18
Latitude: 052:59:54 **Longitude:** 122:28:01

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
WW	LE	0004	pH	pH units	8.10000		8.10000	8.10000	8.10000	0.00000	1984-01-11	1	1
FW	GE	0004	pH	pH units	8.32000		7.65000	7.92857	7.94000	0.20972	1996-04-18	14	14
FW	GE	0007	Residue: Filterable 1.0u	mg/L	1490.00000		140.00000	376.75000	282.00000	354.91718	1996-04-18	12	12
FW	GE	0011	Specific Conductance	uS/cm	453.00000		0.31500	64.85821	0.43850	163.80544	1996-04-18	14	14
WW	LE	0011	Specific Conductance	uS/cm	460.00000		460.00000	460.00000	460.00000	0.00000	1984-01-11	1	1
FW	GE	0101	Alkalinity Phen. 8.3	mg/L	0.5	<	0.5		0.5		1985-10-16	1	0
FW	GE	0102	Alkalinity Total 4.5	mg/L	195.00000		192.00000	193.50000	193.50000	2.12132	1987-02-19	2	2
FW	GE	0103	Carbon Total Organic	mg/L	5.00000	<	0.50000	1.79000	0.70000	1.62830	1996-04-18	11	7
WW	LE	0103	Carbon Total Organic	mg/L	1.00000	<	1.00000		1.00000		1984-01-11	1	0
FW	GE	0104	Chloride Total	mg/L	10.00000	<	0.20000	3.10000	0.50000	4.60507	1996-04-18	12	4
FW	GE	0107	Hardness Total (Total)	mg/L	273.00000		172.00000	225.41667	223.00000	26.47969	1996-04-18	12	12
FW	GE	0108	Nitrogen Amm.Total	mg/L	1.00000	<	0.00500	0.03175	0.00700	0.04564	1996-04-18	11	4
FW	GE	0110	Nitrogen NO3 Total	mg/L	1.00000	<	0.00200	0.01480	0.01550	0.00438	1996-04-18	12	5
WW	LE	0110	Nitrogen NO3 Total	mg/L	0.02000	<	0.02000		0.02000		1984-01-11	1	0
FW	GE	0111	Nitrogen NO2 Total	mg/L	1.00000	<	0.00100	0.00167	0.00150	0.00115	1996-04-18	12	3
FW	GE	0113	Nitrogen Kjel.Tot(N)	mg/L	0.03		0.03	0.03	0.03	0.00	1987-02-19	1	1
FW	GE	0116	Chemical Oxygen Demand	mg/L	21.00000	<	1.00000	9.00000	20.00000	7.64853	1996-04-18	13	5
WW	LE	0116	Chemical Oxygen Demand	mg/L	10.00000	<	10.00000		10.00000		1984-01-11	1	0
FW	GE	0117	Phenols	mg/L	0.004	<	0.002		0.003		1987-02-19	2	0
WW	LE	0117	Phenols	mg/L	0.00200	<	0.00200		0.00200		1984-01-11	1	0
FW	GE	0121	Sulfate Total	mg/L	61.00000		42.00000	46.34000	45.00000	5.36246	1996-04-18	10	10
FW	GE	0124	Carbon Total Inorganic	mg/L	55		49	52	52	4	1987-02-19	2	2
WW	LE	0125	Sulfide Total	mg/L	0.50000	<	0.50000		0.50000		1984-01-11	1	0
FW	GE	0131	Acidity pH 8.3	mg/L	2.80000		2.80000	2.80000	2.80000	0.00000	1985-10-16	1	1
FW	GE	0132	Acidity pH 4.5	mg/L	0.5	<	0.5		0.5		1985-10-16	1	0
FW	GE	0450	Coliform - Fecal	MPN	2.00000	<	2.00000		2.00000		1987-02-19	2	0
FW	GE	0451	Coliform - Total	MPN	2.00000	<	2.00000		2.00000		1987-02-19	2	0
FW	GE	1104	Chloride Dissolved	mg/L	0.50000		0.50000	0.50000	0.50000	0.00000	1987-02-19	1	1
FW	GE	1108	Nitrogen Ammonia Dissolv	mg/L	0.00600		0.00500	0.00550	0.00550	0.00071	1987-02-19	2	2
WW	LE	1108	Nitrogen Ammonia Dissolv	mg/L	0.00500		0.00500	0.00500	0.00500	0.00000	1984-01-11	1	1

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: 0802009 **Name:** QUESNEL LF (PR3132) DW-1, MCKINLEY WELL **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 18
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1984-01-11
Watershed Code: **Most Recent Collection Date:** 1996-04-18
Latitude: 052:59:54 **Longitude:** 122:28:01

Sample State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
WW	LE	1109	Nitrate(NO3) + Nitrite(N(	mg/L	0.02000	<	0.02000		0.02000		1984-01-11	1	0
FW	GE	1109	Nitrate(NO3) + Nitrite(N(	mg/L	0.02000	<	0.02000	0.02000	0.02000	0.00000	1987-02-19	2	1
FW	GE	1111	Nitrogen - Nitrite Disso	mg/L	0.00500	<	0.00500		0.00500		1987-02-19	2	0
WW	LE	1111	Nitrogen - Nitrite Disso	mg/L	0.00500	<	0.00500		0.00500		1984-01-11	1	0
FW	GE	1121	Sulfate Dissolved	mg/L	44.80000		44.50000	44.65000	44.65000	0.21213	1987-02-19	2	2
FW	GE	AL-T	Aluminum Total	mg/L	0.02	<	0.02		0.02		1987-02-19	2	0
WW	LE	AL-T	Aluminum Total	mg/L	0.02000	<	0.02000	0.02000	0.02000	0.00000	1984-07-11	2	1
FW	GE	AS-T	Arsenic Total	mg/L	0.50000		0.00190	0.00200	0.10250	0.00008	1996-04-18	14	4
WW	LE	AS-T	Arsenic Total	mg/L	0.25000	<	0.00100		0.25000		1984-07-11	3	0
FW	GE	C--T	Carbon Total	mg/L	55		49	52	52	4	1987-02-19	2	2
FW	GE	CA-T	Calcium Total	mg/L	55.60		55.40	55.50	55.50	0.14	1987-02-19	2	2
WW	LE	CA-T	Calcium Total	mg/L	53.40000		52.00000	52.70000	52.70000	0.98995	1984-07-11	2	2
WW	LE	CD-T	Cadmium Total	mg/L	0.01000	<	0.00050		0.01000		1984-07-11	3	0
FW	GE	CD-T	Cadmium Total	mg/L	0.02000	<	0.00020	0.00767	0.01000	0.01069	1996-04-18	14	3
FW	GE	CO-T	Cobalt Total	mg/L	0.100	<	0.100		0.100		1987-02-19	2	0
WW	LE	CO-T	Cobalt Total	mg/L	0.10000	<	0.10000		0.10000		1984-07-11	2	0
FW	GE	CR-T	Chromium Total	mg/L	0.01500	<	0.00100	0.00200	0.01000	0.00141	1996-04-18	14	2
WW	LE	CR-T	Chromium Total	mg/L	0.01000	<	0.00500		0.01000		1984-07-11	3	0
WW	LE	CU-T	Copper Total	mg/L	0.78000		0.10000	0.44000	0.44000	0.48083	1984-07-11	2	2
FW	GE	CU-T	Copper Total	mg/L	0.06000	<	0.01000	0.02527	0.01850	0.01551	1996-04-18	14	11
WW	LE	FE-T	Iron Total	mg/L	0.22000		0.10000	0.16000	0.16000	0.08485	1984-07-11	2	2
FW	GE	FE-T	Iron Total	mg/L	0.14000	<	0.02000	0.06100	0.03000	0.05413	1996-04-18	14	5
FW	GE	HG-T	Mercury Total	mg/L	0.00009		0.00009	0.00009	0.00009	0.00000	1987-02-19	1	1
FW	GE	MG-T	Magnesium Total	mg/L	24.50		24.40	24.45	24.45	0.07	1987-02-19	2	2
WW	LE	MG-T	Magnesium Total	mg/L	23.10000		22.30000	22.70000	22.70000	0.56569	1984-07-11	2	2
FW	GE	MN-T	Manganese Total	mg/L	0.35900		0.01100	0.07967	0.05000	0.09988	1996-04-18	14	12
WW	LE	MN-T	Manganese Total	mg/L	0.10000		0.06000	0.08000	0.08000	0.02828	1984-07-11	2	2
WW	LE	MO-T	Molybdenum Total	mg/L	0.01000	<	0.01000		0.01000		1984-07-11	2	0
FW	GE	MO-T	Molybdenum Total	mg/L	0.03000		0.00200	0.00950	0.02000	0.01136	1996-04-18	13	4
WW	LE	NA-D	Sodium Dissolved	mg/L	7.50000		7.50000	7.50000	7.50000	0.00000	1984-01-11	1	1

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: 0802009 **Name:** QUESNEL LF (PR3132) DW-1, MCKINLEY WELL **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 18
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1984-01-11
Watershed Code: **Most Recent Collection Date:** 1996-04-18
Latitude: 052:59:54 **Longitude:** 122:28:01

State	Sample Desc.	Parameter	Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	NI-T Nickel Total	mg/L	0.05000	<	0.05000		0.05000		1987-02-19	2	0
WW	LE	NI-T Nickel Total	mg/L	0.05000	<	0.05000		0.05000		1984-07-11	2	0
FW	GE	PB-T Lead Total	mg/L	0.100	<	0.001	0.028	0.045	0.048	1996-04-18	14	4
WW	LE	PB-T Lead Total	mg/L	0.10000	<	0.00100		0.10000		1984-07-11	3	0
WW	LE	V--T Vanadium Total	mg/L	0.01000	<	0.01000		0.01000		1984-07-11	2	0
FW	GE	V--T Vanadium Total	mg/L	0.010	<	0.010		0.010		1987-02-19	2	0
WW	LE	ZN-T Zinc Total	mg/L	0.03000		0.03000	0.03000	0.03000	0.00000	1984-07-11	2	2
FW	GE	ZN-T Zinc Total	mg/L	0.08700	<	0.01000	0.04267	0.03400	0.02546	1996-04-18	14	12

Outliers are not included, and results less than or greater than
detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Selection Criteria

EMS ID:	E209997
Region:	
Permit ID:	
Office:	
Establishing Agency:	
Location Type:	
Monitoring Group:	
Collection Start Date/Time From	1950-01-01 00:00
Collection Start Date/Time To:	2010-06-01 23:59
Specific Month:	
Sample State:	
Sample Descriptor:	
Study:	
Parameter Code:	
Data Index:	
QA Index:	
Watershed:	
Eco Region:	

Order by

Office Code:	Y
Parameter Code:	Y
Location Type:	N
Sample State Code:	N

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: E209997 **Name:** QUESNEL LF (PR3132) OW-1 **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 27
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1989-08-03
Watershed Code: **Most Recent Collection Date:** 2001-10-24
Latitude: 052:59:52 **Longitude:** 122:28:01

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	0004	pH	pH units	7.60000		6.43000	6.99346	6.94500	0.32621	2001-10-24	26	26
FW	GE	0007	Residue: Filterable 1.0u	mg/L	2100.00000		412.00000	1469.26923	1695.00000	522.69544	2001-10-24	26	26
FW	GE	0011	Specific Conductance	uS/cm	3360.00000		612.00000	2228.30769	2620.00000	900.03026	2001-10-24	26	26
FW	GE	0102	Alkalinity Total 4.5	mg/L	1550.00000		1418.00000	1482.66667	1480.00000	66.04039	2001-10-24	3	3
FW	GE	0103	Carbon Total Organic	mg/L	103.00000		1.70000	24.90000	24.00000	21.26323	2001-10-24	25	25
FW	GE	0104	Chloride Total	mg/L	288.00000		6.00000	164.64211	237.00000	120.26337	1998-04-22	19	19
FW	GE	0107	Hardness Total (Total)	mg/L	1572.00000		316.00000	1103.88000	1210.00000	394.12459	2001-10-24	25	25
FW	GE	0108	Nitrogen Amm.Total	mg/L	5.36000	<	0.00500	1.24088	0.50000	1.78691	2001-07-19	24	17
FW	GE	0110	Nitrogen NO3 Total	mg/L	5.00000	<	0.00500	1.81333	0.02500	1.93809	2001-10-24	25	9
FW	GE	0111	Nitrogen NO2 Total	mg/L	1.00000	<	0.00100	0.00230	0.00500	0.00279	2001-10-24	25	10
FW	GE	0116	Chemical Oxygen Demand	mg/L	170.00000	<	1.00000	81.96250	88.00000	47.85575	2001-10-24	25	24
FW	GE	0118	Phosphorus Ortho	mg/L	0.01000		0.00400	0.00400	0.01000	0.00000	2001-07-19	3	1
FW	GE	0121	Sulfate Total	mg/L	23.00000		5.70000	11.65294	8.50000	6.23399	1998-04-22	17	17
FW	GE	0124	Carbon Total Inorganic	mg/L	315		315	315	315	0	1993-04-29	1	1
FW	GE	1104	Chloride Dissolved	mg/L	371.00000		189.00000	295.14286	317.00000	59.28302	2001-10-24	7	7
FW	GE	1108	Nitrogen Ammonia Dissolv	mg/L	0.00500	<	0.00500		0.00500		1993-04-29	1	0
FW	GE	1109	Nitrate(NO3) + Nitrite(N	mg/L	0.02000	<	0.02000		0.02000		1993-04-29	1	0
FW	GE	1111	Nitrogen - Nitrite Disso	mg/L	0.00500	<	0.00500		0.00500		1993-04-29	1	0
FW	GE	1121	Sulfate Dissolved	mg/L	10.00000		3.70000	6.23333	4.85000	2.95748	2001-10-24	6	6
FW	GE	AG-T	Silver Total	mg/L	0.03	<	0.03		0.03		1993-04-29	1	0
FW	GE	AL-D	Aluminum Dissolved	mg/L	0.20000		0.01000	0.02000	0.02500	0.01414	2001-10-24	4	2
FW	GE	AL-T	Aluminum Total	mg/L	0.06	<	0.06		0.06		1993-04-29	1	0
FW	GE	AS-D	Arsenic Dissolved	mg/L	0.20000		0.01200	0.01700	0.11100	0.00500	2001-10-24	6	3
FW	GE	AS-T	Arsenic Total	mg/L	0.20000	<	0.00010	0.01208	0.03400	0.01977	1998-04-22	20	6
FW	GE	B--D	Boron Dissolved	mg/L	1.30000		0.50000	0.86500	0.83000	0.42532	2001-10-24	4	4
FW	GE	B--T	Boron Total	mg/L	0.48		0.48	0.48	0.48	0.00	1993-04-29	1	1
FW	GE	BA-D	Barium Dissolved	mg/L	0.98600		0.42000	0.76400	0.82500	0.24570	2001-10-24	4	4
FW	GE	BA-T	Barium Total	mg/L	0.573		0.573	0.573	0.573	0.000	1993-04-29	1	1
FW	GE	BE-T	Beryllium Total	mg/L	0.001	<	0.001		0.001		1993-04-29	1	0
FW	GE	BI-T	Bismuth Total	mg/L	0.02	<	0.02		0.02		1993-04-29	1	0

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: E209997 **Name:** QUESNEL LF (PR3132) OW-1 **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 27
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1989-08-03
Watershed Code: **Most Recent Collection Date:** 2001-10-24
Latitude: 052:59:52 **Longitude:** 122:28:01

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	C--T	Carbon Total	mg/L	320		320	320	320	0	1993-04-29	1	1
FW	GE	CA-D	Calcium Dissolved	mg/L	426.00000		321.00000	392.00000	410.50000	47.89572	2001-10-24	4	4
FW	GE	CA-T	Calcium Total	mg/L	505.000		505.000	505.000	505.000	0.000	1993-04-29	1	1
FW	GE	CD-D	Cadmium Dissolved	mg/L	0.01000	<	0.00100		0.00550		2001-10-24	6	0
FW	GE	CD-T	Cadmium Total	mg/L	0.01000		0.00030	0.00286	0.00550	0.00270	1998-04-22	20	5
FW	GE	CO-T	Cobalt Total	mg/L	0.004	<	0.004		0.004		1993-04-29	1	0
FW	GE	CR-D	Chromium Dissolved	mg/L	0.01000		0.00100	0.00100	0.00550	0.00000	2001-10-24	6	3
FW	GE	CR-T	Chromium Total	mg/L	0.01700	<	0.00100	0.00680	0.01000	0.00638	1998-04-22	20	5
FW	GE	CU-D	Copper Dissolved	mg/L	0.02100		0.00900	0.01250	0.01000	0.00569	2001-10-24	6	4
FW	GE	CU-T	Copper Total	mg/L	0.06000		0.00200	0.01100	0.01000	0.00532	1998-04-22	20	8
FW	GE	FE-D	Iron Dissolved	mg/L	1.75000		0.05000	0.49617	0.22500	0.64289	2001-10-24	6	6
FW	GE	FE-T	Iron Total	mg/L	17.00000	<	0.02000	1.80350	0.09250	4.81197	1998-04-22	20	12
FW	GE	K--D	Potassium Dissolved	mg/L	12.20000		11.00000	11.60000	11.60000	0.84853	2001-10-24	2	2
FW	GE	K--T	Potassium Total	mg/L	9.1		9.1	9.1	9.1	0.0	1999-10-20	1	1
FW	GE	MG-D	Magnesium Dissolved	mg/L	117.00000		109.00000	113.00000	113.00000	5.65685	2001-10-24	2	2
FW	GE	MG-T	Magnesium Total	mg/L	113.000		109.000	111.000	111.000	2.828	1999-10-20	2	2
FW	GE	MN-D	Manganese Dissolved	mg/L	8.06000		3.22000	5.86667	6.04000	1.87151	2001-10-24	6	6
FW	GE	MN-T	Manganese Total	mg/L	11.90000	<	0.01100	2.72441	0.43600	4.00300	1998-04-22	20	17
FW	GE	MO-D	Molybdenum Dissolved	mg/L	0.03000		0.00300	0.00300	0.01650	0.00000	2001-10-24	6	3
FW	GE	MO-T	Molybdenum Total	mg/L	0.03000		0.00200	0.01000	0.02100	0.00714	1998-04-22	20	7
FW	GE	NA-D	Sodium Dissolved	mg/L	217.00000		80.00000	161.50000	174.50000	58.54058	2001-10-24	4	4
FW	GE	NI-T	Nickel Total	mg/L	0.03		0.03	0.03	0.03	0.00	1993-04-29	1	1
FW	GE	PB-D	Lead Dissolved	mg/L	0.05000	<	0.00100	0.00250	0.02650	0.00071	2001-10-24	6	2
FW	GE	PB-T	Lead Total	mg/L	0.05000	<	0.00100	0.00560	0.04000	0.00483	1998-04-22	20	5
FW	GE	SB-T	Antimony Total	mg/L	0.02	<	0.02		0.02		1993-04-29	1	0
FW	GE	SE-D	Selenium Dissolved	mg/L	0.20		0.02	0.02	0.03	0.00	2001-10-24	4	3
FW	GE	SE-T	Selenium Total	mg/L	0.03	<	0.03		0.03		1993-04-29	1	0
FW	GE	SI-T	Silicon Total	mg/L	13.20		13.20	13.20	13.20	0.00	1993-04-29	1	1
FW	GE	SN-T	Tin Total	mg/L	0.02	<	0.02		0.02		1993-04-29	1	0
FW	GE	SR-T	Strontium Total	mg/L	2.290		2.290	2.290	2.290	0.000	1993-04-29	1	1

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: E209997 **Name:** QUESNEL LF (PR3132) OW-1 **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 27
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1989-08-03
Watershed Code: **Most Recent Collection Date:** 2001-10-24
Latitude: 052:59:52 **Longitude:** 122:28:01

State	Sample Desc.	Parameter	Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	TE-T Tellurium Total	mg/L	0.02	<	0.02		0.02		1993-04-29	1	0
FW	GE	TI-T Titanium Total	mg/L	0.004		0.004	0.004	0.004	0.000	1993-04-29	1	1
FW	GE	TL-T Thallium Total	mg/L	0.03	<	0.03		0.03		1993-04-29	1	0
FW	GE	V--D Vanadium Dissolved	mg/L	0.03000	<	0.03000		0.03000		1999-05-20	2	0
FW	GE	V--T Vanadium Total	mg/L	0.003	<	0.003		0.003		1993-04-29	1	0
FW	GE	ZN-D Zinc Dissolved	mg/L	0.00700	<	0.00200	0.00650	0.00500	0.00071	2001-10-24	6	2
FW	GE	ZN-T Zinc Total	mg/L	0.08000	<	0.00500	0.02564	0.01350	0.02418	1998-04-22	20	11
FW	GE	ZR-T Zirconium Total	mg/L	0.003	<	0.003		0.003		1993-04-29	1	0

Outliers are not included, and results less than or greater than
detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Selection Criteria

EMS ID:	E210000
Region:	
Permit ID:	
Office:	
Establishing Agency:	
Location Type:	
Monitoring Group:	
Collection Start Date/Time From	1950-01-01 00:00
Collection Start Date/Time To:	2010-06-01 23:59
Specific Month:	
Sample State:	
Sample Descriptor:	
Study:	
Parameter Code:	
Data Index:	
QA Index:	
Watershed:	
Eco Region:	

Order by

Office Code:	Y
Parameter Code:	Y
Location Type:	N
Sample State Code:	N

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: E210000 **Name:** QUESNEL LF (PR3132) OW-4 **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 18
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1989-08-03
Watershed Code: **Most Recent Collection Date:** 1999-05-20
Latitude: 052:59:45 **Longitude:** 122:27:36

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	0004	pH	pH units	7.88000		6.79000	7.26333	7.19500	0.29288	1999-05-20	18	18
FW	GE	0007	Residue: Filterable 1.0u	mg/L	2020.00000		179.00000	742.11765	680.00000	377.81194	1999-05-20	17	17
FW	GE	0011	Specific Conductance	uS/cm	1610.00000		558.00000	1012.00000	980.00000	273.51524	1999-05-20	18	18
FW	GE	0102	Alkalinity Total 4.5	mg/L	82.00000		82.00000	82.00000	82.00000	0.00000	1990-04-19	1	1
FW	GE	0103	Carbon Total Organic	mg/L	44.00000		3.90000	9.45722	7.40000	9.17657	1999-05-20	18	18
FW	GE	0104	Chloride Total	mg/L	25.60000		4.00000	9.66471	5.30000	7.33791	1998-04-22	17	17
FW	GE	0107	Hardness Total (Total)	mg/L	832.00000		258.00000	534.44444	513.50000	148.52697	1999-05-20	18	18
FW	GE	0108	Nitrogen Amm.Total	mg/L	16.00000		0.00900	1.56008	0.40100	4.55447	1999-05-20	15	12
FW	GE	0110	Nitrogen NO3 Total	mg/L	26.20000		0.04900	7.60540	5.13000	8.14581	1999-05-20	18	15
FW	GE	0111	Nitrogen NO2 Total	mg/L	1.00000		0.00100	0.02080	0.04800	0.01896	1999-05-20	18	10
FW	GE	0116	Chemical Oxygen Demand	mg/L	253.00000		13.00000	70.07692	39.00000	68.48779	1999-05-20	15	13
FW	GE	0121	Sulfate Total	mg/L	141.00000		46.00000	72.51429	66.55000	24.44683	1998-04-22	14	14
FW	GE	1104	Chloride Dissolved	mg/L	80.40000		80.40000	80.40000	80.40000	0.00000	1999-05-20	1	1
FW	GE	1121	Sulfate Dissolved	mg/L	123.00000		123.00000	123.00000	123.00000	0.00000	1999-05-20	1	1
FW	GE	AS-D	Arsenic Dissolved	mg/L	0.20000	<	0.20000		0.20000		1999-05-20	1	0
FW	GE	AS-T	Arsenic Total	mg/L	0.20000	<	0.00010	0.00764	0.02700	0.01092	1998-04-22	17	5
FW	GE	CD-D	Cadmium Dissolved	mg/L	0.01000	<	0.01000		0.01000		1999-05-20	1	0
FW	GE	CD-T	Cadmium Total	mg/L	0.01000		0.00070	0.00267	0.00500	0.00156	1998-04-22	17	7
FW	GE	CR-D	Chromium Dissolved	mg/L	0.01000	<	0.01000		0.01000		1999-05-20	1	0
FW	GE	CR-T	Chromium Total	mg/L	0.06000	<	0.00100	0.00250	0.01000	0.00058	1998-04-22	17	4
FW	GE	CU-D	Copper Dissolved	mg/L	0.01000		0.01000	0.01000	0.01000	0.00000	1999-05-20	1	1
FW	GE	CU-T	Copper Total	mg/L	0.06000		0.00400	0.01000	0.01000	0.00675	1998-04-22	17	5
FW	GE	FE-D	Iron Dissolved	mg/L	0.12000		0.12000	0.12000	0.12000	0.00000	1999-05-20	1	1
FW	GE	FE-T	Iron Total	mg/L	1.64000	<	0.02000	0.54467	0.20000	0.50191	1998-04-22	17	12
FW	GE	MN-D	Manganese Dissolved	mg/L	0.02800		0.02800	0.02800	0.02800	0.00000	1999-05-20	1	1
FW	GE	MN-T	Manganese Total	mg/L	8.97000	<	0.00500	0.91233	0.09000	2.27479	1998-04-22	17	15
FW	GE	MO-D	Molybdenum Dissolved	mg/L	0.03000	<	0.03000		0.03000		1999-05-20	1	0
FW	GE	MO-T	Molybdenum Total	mg/L	0.03300		0.00100	0.01900	0.03000	0.01302	1998-04-22	17	6
FW	GE	PB-D	Lead Dissolved	mg/L	0.05000	<	0.05000		0.05000		1999-05-20	1	0
FW	GE	PB-T	Lead Total	mg/L	0.05000		0.00100	0.00550	0.04000	0.00720	1998-04-22	17	6

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: E210000 **Name:** QUESNEL LF (PR3132) OW-4 **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 18
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1989-08-03
Watershed Code: **Most Recent Collection Date:** 1999-05-20
Latitude: 052:59:45 **Longitude:** 122:27:36

Sample State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	V--D	Vanadium Dissolved	mg/L	0.03000	<	0.03000		0.03000		1999-05-20	1	0
FW	GE	ZN-D	Zinc Dissolved	mg/L	0.02200		0.02200	0.02200	0.02200	0.00000	1999-05-20	1	1
FW	GE	ZN-T	Zinc Total	mg/L	0.07300	<	0.00500	0.03513	0.01300	0.02304	1998-04-22	17	8

Outliers are not included, and results less than or greater than
detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Selection Criteria

EMS ID:	E218248
Region:	
Permit ID:	
Office:	
Establishing Agency:	
Location Type:	
Monitoring Group:	
Collection Start Date/Time From	1950-01-01 00:00
Collection Start Date/Time To:	2010-06-01 23:59
Specific Month:	
Sample State:	
Sample Descriptor:	
Study:	
Parameter Code:	
Data Index:	
QA Index:	
Watershed:	
Eco Region:	

Order by

Office Code:	Y
Parameter Code:	Y
Location Type:	N
Sample State Code:	N

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: E218248 **Name:** QUESNEL LF (PR3132) OW-5 **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 21
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1992-10-22
Watershed Code: **Most Recent Collection Date:** 2001-10-24
Latitude: 052:59:45 **Longitude:** 122:27:54

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	0004	pH	pH units	8.00000		6.60000	7.18200	7.21000	0.42440	2001-10-24	20	20
FW	GE	0007	Residue: Filterable 1.0u	mg/L	3040.00000		628.00000	1431.70000	1568.00000	698.51490	2001-10-24	20	20
FW	GE	0011	Specific Conductance	uS/cm	4640.00000		904.00000	2398.25000	2373.50000	1350.13020	2001-10-24	20	20
FW	GE	0102	Alkalinity Total 4.5	mg/L	2170.00000		1419.00000	1809.66667	1840.00000	376.41776	2001-10-24	3	3
FW	GE	0103	Carbon Total Organic	mg/L	551.00000	<	0.50000	89.66882	50.00000	141.00545	2001-10-24	19	17
FW	GE	0104	Chloride Total	mg/L	378.00000		2.00000	104.81667	2.80000	152.00399	1998-04-22	12	12
FW	GE	0107	Hardness Total (Total)	mg/L	1530.00000		226.00000	802.57895	990.00000	457.94448	2001-10-24	19	19
FW	GE	0108	Nitrogen Amm.Total	mg/L	135.00000		0.00700	58.47994	82.65000	55.24833	2001-07-19	18	18
FW	GE	0110	Nitrogen NO3 Total	mg/L	0.35000	<	0.00500	0.07564	0.01600	0.10804	2001-10-24	19	11
FW	GE	0111	Nitrogen NO2 Total	mg/L	0.06800		0.00100	0.01873	0.01400	0.02116	2001-10-24	19	15
FW	GE	0116	Chemical Oxygen Demand	mg/L	1990.00000		16.00000	382.81250	266.00000	495.37827	2001-10-24	19	16
FW	GE	0118	Phosphorus Ortho	mg/L	0.02000	<	0.00100	0.01200	0.00700	0.01131	2001-07-19	4	2
FW	GE	0121	Sulfate Total	mg/L	440.00000	<	1.00000	292.47000	345.00000	156.74781	1998-04-22	12	10
FW	GE	0124	Carbon Total Inorganic	mg/L	31		31	31	31	0	1993-04-29	1	1
FW	GE	1104	Chloride Dissolved	mg/L	372.00000		3.00000	247.12500	278.00000	119.64762	2001-10-24	8	8
FW	GE	1108	Nitrogen Ammonia Dissolv	mg/L	0.11700		0.11700	0.11700	0.11700	0.00000	1993-04-29	1	1
FW	GE	1109	Nitrate(NO3) + Nitrite(N	mg/L	0.02000	<	0.02000		0.02000		1993-04-29	1	0
FW	GE	1111	Nitrogen - Nitrite Disso	mg/L	0.00500	<	0.00500		0.00500		1993-04-29	1	0
FW	GE	1121	Sulfate Dissolved	mg/L	6.00000	<	1.00000	3.44000	3.00000	1.60094	2001-10-24	7	5
FW	GE	AG-T	Silver Total	mg/L	0.03	<	0.03		0.03		1993-04-29	1	0
FW	GE	AL-D	Aluminum Dissolved	mg/L	0.20000		0.06000	0.07000	0.09000	0.01732	2001-10-24	5	3
FW	GE	AL-T	Aluminum Total	mg/L	3.61		3.61	3.61	3.61	0.00	1993-04-29	1	1
FW	GE	AS-D	Arsenic Dissolved	mg/L	0.20000		0.03700	0.05067	0.20000	0.01305	2001-10-24	7	3
FW	GE	AS-T	Arsenic Total	mg/L	0.20000	<	0.00010	0.00195	0.20000	0.00049	1998-04-22	13	2
FW	GE	B--D	Boron Dissolved	mg/L	1.68000		0.70000	1.39600	1.50000	0.39633	2001-10-24	5	5
FW	GE	B--T	Boron Total	mg/L	0.06		0.06	0.06	0.06	0.00	1993-04-29	1	1
FW	GE	BA-D	Barium Dissolved	mg/L	1.46000		0.66000	0.91400	0.75000	0.32654	2001-10-24	5	5
FW	GE	BA-T	Barium Total	mg/L	0.072		0.072	0.072	0.072	0.000	1993-04-29	1	1
FW	GE	BE-T	Beryllium Total	mg/L	0.001	<	0.001		0.001		1993-04-29	1	0
FW	GE	BI-T	Bismuth Total	mg/L	0.02	<	0.02		0.02		1993-04-29	1	0

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: E218248 **Name:** QUESNEL LF (PR3132) OW-5
Location Type: WELL
Office: CARIBOO, WILLIAMS LAKE
No. Samples: 21
Establishing Agency: Cariboo, Williams Lake
First Collection Date: 1992-10-22
Watershed Code:
Most Recent Collection Date: 2001-10-24
Latitude: 052:59:45 **Longitude:** 122:27:54

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	C--T	Carbon Total	mg/L	58		58	58	58	0	1993-04-29	1	1
FW	GE	CA-D	Calcium Dissolved	mg/L	292.00000		241.00000	271.20000	275.00000	18.66012	2001-10-24	5	5
FW	GE	CA-T	Calcium Total	mg/L	75.700		75.700	75.700	75.700	0.000	1993-04-29	1	1
FW	GE	CD-D	Cadmium Dissolved	mg/L	0.01000	<	0.00100	0.00200	0.01000	0.00000	2001-10-24	7	1
FW	GE	CD-T	Cadmium Total	mg/L	0.01000	<	0.00020		0.01000		1998-04-22	13	0
FW	GE	CO-T	Cobalt Total	mg/L	0.004	<	0.004		0.004		1993-04-29	1	0
FW	GE	CR-D	Chromium Dissolved	mg/L	0.03000		0.00400	0.01267	0.01000	0.01501	2001-10-24	7	3
FW	GE	CR-T	Chromium Total	mg/L	0.015		0.005	0.005	0.010	0.000	1998-04-22	13	1
FW	GE	CU-D	Copper Dissolved	mg/L	0.01000	<	0.00100	0.00400	0.01000	0.00000	2001-10-24	7	1
FW	GE	CU-T	Copper Total	mg/L	0.010		0.009	0.009	0.010	0.000	1998-04-22	13	1
FW	GE	FE-D	Iron Dissolved	mg/L	152.00000		56.00000	89.34286	89.40000	32.65057	2001-10-24	7	7
FW	GE	FE-T	Iron Total	mg/L	92.00000	<	0.03000	33.93833	0.20000	38.18382	1998-04-22	13	6
FW	GE	K--D	Potassium Dissolved	mg/L	79.00000		64.20000	71.60000	71.60000	10.46518	2001-10-24	2	2
FW	GE	K--T	Potassium Total	mg/L	63.1		63.1	63.1	63.1	0.0	1999-10-20	1	1
FW	GE	MG-D	Magnesium Dissolved	mg/L	98.40000		71.80000	85.10000	85.10000	18.80904	2001-10-24	2	2
FW	GE	MG-T	Magnesium Total	mg/L	135.000		27.700	81.350	81.350	75.873	1999-10-20	2	2
FW	GE	MN-D	Manganese Dissolved	mg/L	1.97000		0.68900	1.37043	1.28000	0.51500	2001-10-24	7	7
FW	GE	MN-T	Manganese Total	mg/L	2.48000		0.06800	0.62685	0.33700	0.67969	1998-04-22	13	13
FW	GE	MO-D	Molybdenum Dissolved	mg/L	0.03000		0.00100	0.00267	0.03000	0.00153	2001-10-24	7	3
FW	GE	MO-T	Molybdenum Total	mg/L	0.06000	<	0.03000	0.04043	0.03100	0.00981	1998-04-22	13	7
FW	GE	NA-D	Sodium Dissolved	mg/L	343.00000		160.00000	257.40000	243.00000	73.32326	2001-10-24	5	5
FW	GE	NI-T	Nickel Total	mg/L	0.01	<	0.01		0.01		1993-04-29	1	0
FW	GE	PB-D	Lead Dissolved	mg/L	0.05000		0.00100	0.00267	0.05000	0.00208	2001-10-24	7	3
FW	GE	PB-T	Lead Total	mg/L	0.05000	<	0.00100	0.00300	0.05000	0.00000	1998-04-22	13	1
FW	GE	SB-T	Antimony Total	mg/L	0.02	<	0.02		0.02		1993-04-29	1	0
FW	GE	SE-D	Selenium Dissolved	mg/L	0.20		0.01	0.02	0.03	0.01	2001-10-24	5	3
FW	GE	SE-T	Selenium Total	mg/L	0.03	<	0.03		0.03		1993-04-29	1	0
FW	GE	SI-T	Silicon Total	mg/L	8.90		8.90	8.90	8.90	0.00	1993-04-29	1	1
FW	GE	SN-T	Tin Total	mg/L	0.02	<	0.02		0.02		1993-04-29	1	0
FW	GE	SR-T	Strontium Total	mg/L	0.415		0.415	0.415	0.415	0.000	1993-04-29	1	1

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: E218248 **Name:** QUESNEL LF (PR3132) OW-5 **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 21
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1992-10-22
Watershed Code: **Most Recent Collection Date:** 2001-10-24
Latitude: 052:59:45 **Longitude:** 122:27:54

State	Sample Desc.	Parameter	Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	TE-T Tellurium Total	mg/L	0.02	<	0.02		0.02		1993-04-29	1	0
FW	GE	TI-T Titanium Total	mg/L	0.099		0.099	0.099	0.099	0.000	1993-04-29	1	1
FW	GE	TL-T Thallium Total	mg/L	0.03	<	0.03		0.03		1993-04-29	1	0
FW	GE	V--D Vanadium Dissolved	mg/L	0.03000	<	0.03000		0.03000		1999-05-20	2	0
FW	GE	V--T Vanadium Total	mg/L	0.010		0.010	0.010	0.010	0.000	1993-04-29	1	1
FW	GE	ZN-D Zinc Dissolved	mg/L	0.01500	<	0.00200	0.01240	0.01200	0.00219	2001-10-24	7	5
FW	GE	ZN-T Zinc Total	mg/L	0.04000	<	0.00500	0.02060	0.00500	0.01167	1998-04-22	13	5
FW	GE	ZR-T Zirconium Total	mg/L	0.003	<	0.003		0.003		1993-04-29	1	0

Outliers are not included, and results less than or greater than
detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Selection Criteria

EMS ID:	0601024
Region:	
Permit ID:	
Office:	
Establishing Agency:	
Location Type:	
Monitoring Group:	
Collection Start Date/Time From	1950-01-01 00:00
Collection Start Date/Time To:	2010-06-01 23:59
Specific Month:	
Sample State:	
Sample Descriptor:	
Study:	
Parameter Code:	
Data Index:	
QA Index:	
Watershed:	
Eco Region:	

Order by

Office Code:	Y
Parameter Code:	Y
Location Type:	N
Sample State Code:	N

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: 0601024 **Name:** QUESNEL LF (PR3132) SCHOOL DIST. WELL SOUTH OF LANDFILL **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 30
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1975-02-26
Watershed Code: **Most Recent Collection Date:** 1980-06-12
Latitude: 052:59:44 **Longitude:** 122:27:36

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	0004	pH	pH units	8.00000		7.00000	7.50000	7.50000	0.70711	1975-12-11	2	2
WW	LE	0004	pH	pH units	9.00000		6.80000	7.82692	7.95000	0.49684	1980-06-12	26	26
WW	LE	0005	Residue: Total (Total So	mg/L	428.00000		212.00000	247.23077	230.00000	57.98585	1980-06-12	13	13
FW	GE	0005	Residue: Total (Total So	mg/L	226.00000		226.00000	226.00000	226.00000	0.00000	1975-12-11	1	1
FW	GE	0007	Residue: Filterable 1.0u	mg/L	222.00000		222.00000	222.00000	222.00000	0.00000	1975-12-11	1	1
WW	LE	0007	Residue: Filterable 1.0u	mg/L	228.00000		170.00000	215.27273	222.00000	16.42614	1978-05-25	11	11
WW	LE	0008	Residue: Non-filterable	mg/L	1.00000	<	1.00000		1.00000		1979-06-06	1	0
FW	GE	0011	Specific Conductance	uS/cm	380.00000		380.00000	380.00000	380.00000	0.00000	1975-12-11	1	1
WW	LE	0011	Specific Conductance	uS/cm	540.00000		296.00000	396.19231	388.50000	55.60865	1980-06-12	26	26
FW	GE	0013	Temperature	C	7.00000		7.00000	7.00000	7.00000	0.00000	1975-12-11	1	1
WW	LE	0013	Temperature	C	16.00000		6.00000	9.22500	8.85000	2.95239	1978-05-25	12	12
WW	LE	0014	Oxygen Dissolved	mg/L	5.90000		1.60000	3.40833	3.00000	1.52343	1978-05-25	12	12
FW	GE	0014	Oxygen Dissolved	mg/L	3.30000		3.30000	3.30000	3.30000	0.00000	1975-12-11	1	1
WW	LE	0015	Turbidity	NTU	80.00000		0.70000	13.53636	3.30000	23.39104	1978-05-25	11	11
FW	GE	0015	Turbidity	NTU	3.70000		3.70000	3.70000	3.70000	0.00000	1975-12-11	1	1
WW	LE	0024	Color TAC	TAC	2.00000	<	1.00000	1.50000	1.00000	0.70711	1977-12-14	3	2
WW	LE	0102	Alkalinity Total 4.5	mg/L	186.00000		168.00000	176.60000	174.00000	7.60263	1978-05-25	5	5
FW	GE	0102	Alkalinity Total 4.5	mg/L	175.00000		175.00000	175.00000	175.00000	0.00000	1975-12-11	1	1
WW	LE	0103	Carbon Total Organic	mg/L	5.00000	<	1.00000	2.66667	1.00000	1.50555	1978-05-25	11	6
FW	GE	0103	Carbon Total Organic	mg/L	1.00000	<	1.00000		1.00000		1975-12-11	1	0
WW	LE	0110	Nitrogen NO3 Total	mg/L	0.10000	<	0.02000	0.06000	0.02000	0.05657	1980-06-12	7	2
WW	LE	0113	Nitrogen Kjel.Tot(N)	mg/L	0.11000		0.02000	0.05545	0.05000	0.02622	1978-05-25	11	11
FW	GE	0113	Nitrogen Kjel.Tot(N)	mg/L	0.03000		0.03000	0.03000	0.03000	0.00000	1975-12-11	1	1
WW	LE	0114	Nitrogen Total	mg/L	0.15000		0.02000	0.06727	0.06000	0.03927	1978-05-25	11	11
FW	GE	0114	Nitrogen Total	mg/L	0.03000		0.03000	0.03000	0.03000	0.00000	1975-12-11	1	1
WW	LE	0115	Biochemical Oxygen Deman	mg/L	10.00000	<	10.00000		10.00000		1975-07-15	5	0
WW	LE	0116	Chemical Oxygen Demand	mg/L	42.60000	<	10.00000	42.60000	10.00000	0.00000	1980-06-12	8	1
FW	GE	0116	Chemical Oxygen Demand	mg/L	10.00000	<	10.00000		10.00000		1975-12-11	1	0
WW	LE	0117	Phenols	mg/L	0.00300	<	0.00200	0.00250	0.00200	0.00058	1978-05-25	10	4
FW	GE	0117	Phenols	mg/L	0.00200	<	0.00200		0.00200		1975-12-11	1	0

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: 0601024 **Name:** QUESNEL LF (PR3132) SCHOOL DIST. WELL SOUTH OF LANDFILL **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 30
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1975-02-26
Watershed Code: **Most Recent Collection Date:** 1980-06-12
Latitude: 052:59:44 **Longitude:** 122:27:36

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	0124	Carbon Total Inorganic	mg/L	42.00000		42.00000	42.00000	42.00000	0.00000	1975-12-11	1	1
WW	LE	0124	Carbon Total Inorganic	mg/L	50.00000		34.00000	43.63636	45.00000	4.58852	1978-05-25	11	11
WW	LE	0125	Sulfide Total	mg/L	0.60000	<	0.50000	0.60000	0.50000	0.00000	1975-10-29	6	1
FW	GE	0125	Sulfide Total	mg/L	0.50000	<	0.50000		0.50000		1975-12-11	1	0
WW	LE	1104	Chloride Dissolved	mg/L	1.60000	<	0.50000	0.80000	0.50000	0.53541	1978-05-25	5	4
FW	GE	1104	Chloride Dissolved	mg/L	0.50000		0.50000	0.50000	0.50000	0.00000	1975-12-11	1	1
WW	LE	1107	Hardness Total (Dissolve	mg/L	198.00000		183.00000	190.80000	193.00000	6.90652	1978-05-25	5	5
WW	LE	1109	Nitrate(NO3) + Nitrite(N	mg/L	0.10000	<	0.02000	0.05000	0.02000	0.04359	1980-06-12	12	3
FW	GE	1110	Nitrate (NO3) Dissolved	mg/L	0.02000	<	0.02000		0.02000		1975-12-11	1	0
WW	LE	1110	Nitrate (NO3) Dissolved	mg/L	0.02000	<	0.02000		0.02000		1975-10-29	1	0
FW	GE	1111	Nitrogen - Nitrite Disso	mg/L	0.00500	<	0.00500		0.00500		1975-12-11	1	0
WW	LE	1111	Nitrogen - Nitrite Disso	mg/L	0.00500	<	0.00500		0.00500		1980-06-12	8	0
WW	LE	1121	Sulfate Dissolved	mg/L	35.10000		23.00000	30.26154	30.60000	3.67436	1980-06-12	13	13
FW	GE	1121	Sulfate Dissolved	mg/L	32.90000		32.90000	32.90000	32.90000	0.00000	1975-12-11	1	1
WW	LE	CA-D	Calcium Dissolved	mg/L	45.30000		40.20000	43.05000	43.35000	2.11108	1978-05-25	4	4
WW	LE	CU-D	Copper Dissolved	mg/L	0.01300	<	0.00100	0.00563	0.00200	0.00431	1978-06-01	11	8
FW	GE	CU-D	Copper Dissolved	mg/L	0.00200		0.00200	0.00200	0.00200	0.00000	1975-12-11	1	1
WW	LE	CU-T	Copper Total	mg/L	0.00200		0.00200	0.00200	0.00200	0.00000	1978-05-25	1	1
WW	LE	FE-D	Iron Dissolved	mg/L	1.10000	<	0.10000	0.33333	0.10000	0.38297	1978-06-01	11	6
FW	GE	FE-D	Iron Dissolved	mg/L	0.20000		0.20000	0.20000	0.20000	0.00000	1975-12-11	1	1
WW	LE	FE-T	Iron Total	mg/L	0.20000		0.20000	0.20000	0.20000	0.00000	1978-05-25	1	1
WW	LE	K--D	Potassium Dissolved	mg/L	1.30000		1.30000	1.30000	1.30000	0.00000	1978-05-25	2	2
WW	LE	MG-D	Magnesium Dissolved	mg/L	21.30000		20.00000	20.63333	20.60000	0.65064	1978-05-25	3	3
WW	LE	MN-D	Manganese Dissolved	mg/L	0.11000		0.04000	0.08900	0.09000	0.01912	1978-06-01	10	10
FW	GE	MN-D	Manganese Dissolved	mg/L	0.09000		0.09000	0.09000	0.09000	0.00000	1975-12-11	1	1
WW	LE	MN-T	Manganese Total	mg/L	0.09000		0.09000	0.09000	0.09000	0.00000	1978-05-25	1	1
WW	LE	NA-D	Sodium Dissolved	mg/L	6.90000		6.30000	6.60000	6.60000	0.42426	1978-05-25	2	2
WW	LE	P--D	Phosphorus Total Dissolv	mg/L	0.00400		0.00400	0.00400	0.00400	0.00000	1976-10-20	1	1
WW	LE	P--T	Phosphorus Total	mg/L	0.03700		0.00700	0.01327	0.00900	0.00925	1978-05-25	11	11
FW	GE	P--T	Phosphorus Total	mg/L	0.01000		0.01000	0.01000	0.01000	0.00000	1975-12-11	1	1

Outliers are not included, and results less than or greater than detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: 0601024 **Name:** QUESNEL LF (PR3132) SCHOOL DIST. WELL SOUTH OF LANDFILL **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 30
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1975-02-26
Watershed Code: **Most Recent Collection Date:** 1980-06-12
Latitude: 052:59:44 **Longitude:** 122:27:36

State	Sample Desc.	Parameter	Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
WW	LE	PB-D Lead Dissolved	mg/L	0.00300	<	0.00100	0.00200	0.00100	0.00141	1978-06-01	10	2
FW	GE	PB-D Lead Dissolved	mg/L	0.00100		0.00100	0.00100	0.00100	0.00000	1975-12-11	1	1
WW	LE	PB-T Lead Total	mg/L	0.00100	<	0.00100		0.00100		1978-05-25	1	0
WW	LE	ZN-D Zinc Dissolved	mg/L	0.62000		0.05000	0.24745	0.25000	0.16311	1978-06-01	11	11
FW	GE	ZN-D Zinc Dissolved	mg/L	0.04000		0.04000	0.04000	0.04000	0.00000	1975-12-11	1	1
WW	LE	ZN-T Zinc Total	mg/L	0.21000		0.21000	0.21000	0.21000	0.00000	1978-05-25	1	1

Outliers are not included, and results less than or greater than
detection limits have been excluded in Mean and Standard Deviation.

Environmental Monitoring System
Historical Statistics Report

Selection Criteria

EMS ID:	E222769
Region:	
Permit ID:	
Office:	
Establishing Agency:	
Location Type:	
Monitoring Group:	
Collection Start Date/Time From	1950-01-01 00:00
Collection Start Date/Time To:	2010-06-01 23:59
Specific Month:	
Sample State:	
Sample Descriptor:	
Study:	
Parameter Code:	
Data Index:	
QA Index:	
Watershed:	
Eco Region:	

Order by

Office Code:	Y
Parameter Code:	Y
Location Type:	N
Sample State Code:	N

Environmental Monitoring System
Historical Statistics Report

Monitoring Location: E222769 **Name:** QUESNEL LF (PR 3132) SPCA **Location Type:** WELL
Office: CARIBOO, WILLIAMS LAKE **No. Samples:** 11
Establishing Agency: Cariboo, Williams Lake **First Collection Date:** 1990-04-19
Watershed Code: **Most Recent Collection Date:** 1996-10-16
Latitude: 052:59:42 **Longitude:** 122:27:36

State	Sample Desc.	Parameter		Units	Maximum		Minimum	Mean	Median	Standard Deviation	Latest Date	Total Obs.	Used Obs.
FW	GE	0004	pH	pH units	8.15000		7.69000	7.84909	7.80000	0.14384	1996-10-16	11	11
FW	GE	0007	Residue: Filterable 1.0u	mg/L	356.00000		218.00000	258.40000	237.50000	45.30195	1996-10-16	10	10
FW	GE	0011	Specific Conductance	uS/cm	430.00000		329.00000	396.54545	402.00000	30.14420	1996-10-16	11	11
FW	GE	0103	Carbon Total Organic	mg/L	5.00000	<	0.50000	1.98333	0.50000	1.76796	1996-10-16	11	6
FW	GE	0104	Chloride Total	mg/L	7.00000	<	0.50000	2.32500	0.50000	3.12343	1996-10-16	11	4
FW	GE	0107	Hardness Total (Total)	mg/L	272.00000		185.00000	209.81818	203.00000	22.71043	1996-10-16	11	11
FW	GE	0108	Nitrogen Amm.Total	mg/L	1.00000	<	0.00100	0.05450	0.00500	0.06435	1996-10-16	11	2
FW	GE	0110	Nitrogen NO3 Total	mg/L	1.00000	<	0.00500		0.00500		1996-10-16	11	0
FW	GE	0111	Nitrogen NO2 Total	mg/L	1.00000	<	0.00100	0.00450	0.00200	0.00635	1996-10-16	11	4
FW	GE	0116	Chemical Oxygen Demand	mg/L	20.00000	<	1.00000	15.00000	20.00000	0.00000	1996-10-16	11	1
FW	GE	0121	Sulfate Total	mg/L	43.00000		30.00000	32.60000	31.90000	3.64005	1996-10-16	11	11
FW	GE	AS-T	Arsenic Total	mg/L	0.20000		0.00120	0.00120	0.20000	0.00000	1996-10-16	11	3
FW	GE	CD-T	Cadmium Total	mg/L	0.01000	<	0.00020	0.00100	0.01000	0.00000	1996-10-16	11	1
FW	GE	CR-T	Chromium Total	mg/L	0.01500		0.00400	0.00400	0.01500	0.00000	1996-10-16	11	2
FW	GE	CU-T	Copper Total	mg/L	0.06000	<	0.00100		0.01000		1996-10-16	11	0
FW	GE	FE-T	Iron Total	mg/L	0.48000	<	0.03000	0.27067	0.04000	0.16455	1996-10-16	11	6
FW	GE	MN-T	Manganese Total	mg/L	0.12800		0.05900	0.08573	0.08700	0.01953	1996-10-16	11	11
FW	GE	MO-T	Molybdenum Total	mg/L	0.03000		0.00200	0.00467	0.03000	0.00379	1996-10-16	11	3
FW	GE	PB-T	Lead Total	mg/L	0.05000	<	0.00100	0.00200	0.05000	0.00141	1996-10-16	11	2
FW	GE	ZN-T	Zinc Total	mg/L	0.34000		0.03100	0.08473	0.04900	0.08817	1996-10-16	11	11

Outliers are not included, and results less than or greater than
detection limits have been excluded in Mean and Standard Deviation.

Appendix E

Tables

Table 1: Summary of Groundwater Elevations from 2006 to November 2022
2022 Annual Monitoring, Quesnel Municipal Landfill
KX05593

Well ID	Total Depth (mbgs)	Top of Pipe Elevation (m)	Bottom of Screen Elevation (mbtr)	GROUNDWATER ELEVATION (m)																																	
				May-06	Sep-06	May-07	Nov-07	May-08	Nov-08	May-09	Sep-09	Aug-10	Oct-10	May-11	Oct-11	Jun-12	Oct-12	May-13	Oct-13	Apr-14	Sep-14	May-15	Oct-15	May-16	Sep-16	May-17	Oct-17	May-18	Oct-18	Jun-19	Oct-19	Jun-20	Oct-20	Jun-21	Oct-21	Jun-22	Nov-22
OW-1	23.21	533.95	510.74	522.32	522.25	522.44	522.33	522.42	522.28	522.49	522.27	522.80	522.84	522.99	519.97	522.93	522.83	523.00	522.92	523.12	522.92	523.06	522.88	522.91	523.06	522.98	522.92	523.27	523.04	522.97	522.94	523.04	522.90	523.03	522.87	522.97	522.83
OW-2	10.90	533.34	522.44																																		
OW-3	12.20	534.63	522.43																																		
OW-4		529.77																																			
OW-5S		534.52																																			
OW-5D		534.46																																			
OW-5A	16.68	542.54	525.86	531.13	531.08	531.18	531.04	528.16	527.94	528.18	528.27	528.23	528.20	528.34	528.50	528.55		528.63																			
OW-6	28.14	537.98	510.03	522.25	522.16	522.36	522.27	522.35	522.21	522.40	522.20	522.15	522.22	522.37	522.28	522.31	522.20	522.36	522.28	522.49	522.30	522.50	522.25	522.29	522.37	522.34	522.28	522.43	522.38	522.34	522.30	522.39	522.32	522.40	522.26	522.33	522.15
OW-7	23.09	534.00	510.91	522.33	522.25	522.44	522.33	522.43	522.28	522.49	522.27	522.24	522.30	522.39	522.36	522.41	522.29	[1]523.08	522.97	523.19	522.98	523.12	522.94	522.98	523.12	523.05	523.00	523.18	523.13	523.05		523.12	523.03	523.11	522.96	523.04	522.91
MW05-8S	18.91	534.98	516.08	519.07	518.98	519.23	519.19	519.29	519.09	519.32	519.05	519.25	519.19	519.38	519.18	519.25	519.08	519.30	519.23	519.47	519.18	519.38	519.22	519.20	519.41	519.36	519.19	519.47	519.51	519.43	519.40	519.45	519.36	519.51	519.30	519.43	519.25
MW05-8D	61.00	535.09	474.09	529.55	529.08	529.49	529.56	529.46	529.56		529.20	529.43	529.52	530.77	530.77	530.77																						
MW08-8D	67.45	535.06	467.61						475.92	475.71	476.13	535.06	475.59	475.34	476.39	475.81	476.18	475.49	475.90	475.24	476.36	475.84	475.79	475.59	475.95	475.26	475.58	475.24	475.80	475.98	476.28	476.11	477.18	476.60	476.65	476.95	476.46
MW05-9	15.73	534.26	518.53	522.43	522.40	522.58	522.50	522.41	522.46	522.65	522.41	522.35	522.43	522.63	522.45	522.49	522.41	522.52																			
MW05-10	34.12	505.66	471.54	474.98	476.00	475.31	475.87	475.36	475.93		476.14		475.55	475.23	476.40	477.61	476.38	[1]475.04	475.86	475.59	476.34	475.71	475.77	475.54	475.36	475.14	475.59	475.22	475.85	475.95	476.38	476.01	477.25	476.57	476.60	476.86	476.66
MW07-11	3.69	546.96	543.27			543.28	543.28			543.39				543.40	543.30	543.35	Dry	543.35	Dry	543.42	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW07-12	3.07	546.32	543.25			544.32	543.71	544.20		544.32				544.33		544.12	Dry	544.15	Dry	544.47	Dry	544.33	Dry	Dry	Dry	544.33	Dry	544.33	Dry	543.95	Dry	544.31	543.57	544.27	Dry	543.83	Dry
MW11-13D	65.54	534.04	468.50											475.19	476.24	475.61	476.02	475.46	475.72	475.02	476.19	475.67	474.59	475.40	475.77	475.10	475.37	475.06	475.70	475.78	476.22	475.82	476.69	476.38	476.42	476.62	476.29
MW11-13S	12.61	533.79	521.18												522.36	522.45	522.34	522.48	522.39	522.42	522.32	522.52	522.34	522.42	522.43	522.42	522.34	522.46	522.38	522.38	522.36	522.41	522.36	522.36	522.34	522.38	522.39
MW11-14	10.65	534.12	523.47											524.92	524.76	524.83	524.75	524.89	524.74	525.02	524.78	524.96	524.73	524.83	524.74	524.89	524.69	525.03	524.73	524.92	524.75	524.95	524.76	524.93	524.72	524.85	524.71

Well ID	Total Depth (mbg)	Top of Pipe Elev (m)	Stick up (m)	STATIC WATER DEPTH (m)																																	
				May-06	Sep-06	May-07	Nov-07	May-08	Nov-08	May-09	Sep-09	Aug-10	Oct-10	May-11	Oct-11	Jun-12	Oct-12	May-13	Oct-13	Apr-14	Sep-14	May-15	Oct-15	May-16	Sep-16	May-17	Oct-17	May-18	Oct-18	Jun-19	Oct-19	Jun-20	Oct-20	Jun-21	Oct-21	Jun-22	Nov-22
OW-1	23.21	533.95		11.64	11.703	11.516	11.628	11.534	11.675	11.469	11.685	11.151	11.115	10.962	13.98	11.029	11.125	10.952	11.035	10.834	11.034	10.89	11.07	11.05	10.89	10.975	11.03	10.682	10.91	10.985	11.018	10.919	11.05	10.924	11.08	10.985	11.12
OW-2	10.90	533.34																																			
OW-3	12.20	534.63																																			
OW-4		529.77																																			
OW-5S		534.52																																			
OW-5D		534.46																																			
OW-5A	16.68	542.54		11.40	11.46	11.36	11.50	14.38	14.60	14.36	14.27	14.31	14.33	14.20	14.04	13.985		13.91																			
OW-6	28.14	537.98		8.60	8.68	8.49	8.58	8.49	8.63	8.44	8.64	8.70	8.63	8.47	8.57	8.536	8.64	8.484	8.564	8.35	8.545	8.34	8.59	8.56	8.47	8.505	8.563	8.415	8.46	8.5	8.545	8.452	8.521	8.445	8.5871	8.51	15.83
OW-7	23.09	534.00		11.68	11.75	11.56	11.68	11.58	11.73	11.51	11.73	11.76	11.70	11.62	11.65	11.597	11.71	10.921	11.035	10.816	11.02	10.88	11.06	11.02	10.88	10.95	11	10.825	10.87	10.955		10.88	10.975	10.894	11.045	10.96	11.09
MW05-8S	18.91	534.98		15.92	16.007	15.752	15.796	15.697	15.89	15.66	15.93	15.729	15.795	15.606	15.806	15.728	15.898	15.68	15.753	15.512	15.8	15.6	15.76	15.78	15.57	15.626	15.795	15.511	15.47	15.555	15.58	15.53	15.622	15.475	15.686	15.556	15.73
MW05-8D	61.00	535.09		5.54	6.009	5.600	5.53	5.628	5.53		5.892	5.654	5.564	4.314	4.314	4.314																						
MW08-8D	67.45	535.06							59.15	59.36	58.94		59.47	59.72	58.67	59.248	58.88	59.574	59.16	59.82	58.7	59.22	59.27	59.48	59.12	59.8	59.485	59.823	59.265	59.08	58.78	58.95	57.88	58.465	58.415	58.109	58.60
MW05-9	15.73	534.26		11.83	11.85	11.68	11.76	11.85	11.80	11.61	11.85	11.91	11.82	11.62	11.80	11.771	11.846	11.739																			
MW05-10	34.12	505.66		30.68	29.660	30.345	29.79	30.293	29.73		29.52	29.889	30.105	30.425	29.261	28.051	29.28	30.62	29.8	30.07	29.321	29.95	29.885	30.12	30.30	30.515	30.065	30.44	29.81	29.705	29.273	29.65	28.41	29.091	29.055	28.80	28.99
MW07-11	3.69	546.96				3.681	3.681			3.58				3.562	3.664	3.611	Dry	3.61	Dry	3.546	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	3.62	Dry	3.675	Dry
MW07-12	3.07	546.32				2.000	2.618	2.123		2.00				1.998		2.208	Dry	2.175	Dry	1.852	Dry	1.99	Dry	Dry	Dry	1.995	Dry	1.99	Dry	2.37	Dry	2.015	2.755	2.055	Dry	2.49	Dry
MW11-13D	65.54	534.04												58.849	57.805	58.429	58.025	58.581	58.318	59.025	57.85	58.37	59.45	58.64	58.27	58.945	58.67	58.985	58.34	58.265	57.825	58.22	57.35	57.656	57.625	57.42	57.75
MW11-13S	12.61	533.79													11.422	11.336	11.445	11.309	11.4	11.365	11.471	11.27	11.45	11.37	11.36	11.367	11.442	11.33	11.41	11.406	11.43	11.375	11.43	11.429	11.445	11.411	11.40
MW11-14	10.65	534.12												9.201	9.357	9.283	9.365	9.231	9.374	9.1	9.335	9.16	9.39	9.29	9.38	9.225	9.43	9.09	9.385	9.195	9.37	9.17	9.357	9.185	9.395	9.267	9.41

Notes:
mbgs - meters below ground surface

1: Groundwater elevation not included in groundwater contours
OW7 needs to be resurveyed, stickup reduced to flush mount

Table 2: Groundwater Analytical Summary Table - General Chemistry and Field Data
2022 Annual Monitoring, Quesnel Municipal Landfill
KX05593

Parameter	Units			Perched Aquifer															
				MW07-12	OW-1				OW-6		OW-7		MW05-8S		MW11-13S		MW11-14		PM	
		AW	DW	17-Jun-2022	17-Jun-2022	Field Duplicate (DUP 1)	2-Nov-2022	Field Duplicate (DUP 2)	17-Jun-2022	2-Nov-2022	17-Jun-2022	3-Nov-2022	17-Jun-2022	2-Nov-2022	17-Jun-2022	2-Nov-2022	17-Jun-2022	2-Nov-2022	17-Jun-2022	2-Nov-2022
Field pH	pH Units	ns	ns	-	6.73	-	6.85	-	6.7	6.88	6.66	6.69	6.75	6.95	-	8.03	6.82	7	7.71	7.94
Field Conductivity	mS/cm	ns	ns	-	3.649	-	2.53	-	31.83	2.11	2.578	2.25	2.896	1.99	-	0.52	3.818	2.79	6.87	0.475
Field Temperature	ºC	ns	ns	-	9.86	-	9.6	-	9.54	9.8	10.43	9.5	10.05	9.6	-	6	12.98	12.2	8.60	7.10
Field Dissolved Oxygen	mg/L	ns	ns	-	3.49	-	1.19	-	2.10	2.48	2.50	1.64	3.45	7.1	-	8.8	2.58	2.54	3.00	0.41
Field ORP	mV	ns	ns	-	-49.6	-	18.4	-	-81.4	-31.7	-29.0	38.6	-84.1	-39.5	-	46.8	-88.2	-45.2	66.7	23.2
Total Dissolved Solids	g/L	ns	ns	-	2.372	-	-	-	2.069	-	1.676	-	1.883	-	-	-	2.481	-	0.445	-
Routine Groundwater Quality Indicators-																				
Conductivity	uS/cm	ns	ns	883	3280	3250	3550	3580	2720	2850	2140	3170	2450	2660	708	803	3320	3510	646	739
Hardness (as CaCO3)	µg/L	ns	ns	594000	1570000	1510000	1660000	1600000	922000	969000	1310000	1750000	932000	982000	385000	424000	1090000	1180000	324000	369000
pH	pH	ns	ns	8.03	7.47	7.54	7.05	7	7.54	6.97	7.44	6.89	7.7	7.05	8.12	8.1	7.69	7.05	8.5	8.31
Total Dissolved Solids	µg/L	ns	ns	610000	2160000	2120000	2280000	2330000	1470000	1570000	1530000	2130000	1390000	1480000	473000	514000	1900000	1880000	383000	502000
Turbidity	NTU	ns	ns	16.7	264	308	220	226	380	357	68	66.9	257	356	11.2	23.3	357	310	3.24	9.48
Alkalinity, Bicarbonate (as CaCO3)	µg/L	ns	ns	454000	1360000	1340000	1510000	1530000	1160000	1220000	849000	1350000	1060000	1190000	217000	277000	1560000	1680000	255000	276000
Alkalinity, Carbonate (as CaCO3)	µg/L	ns	ns	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	20600	4800
Alkalinity, Hydroxide (as CaCO3)	µg/L	ns	ns	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity, Total (as CaCO3)	µg/L	ns	ns	454000	1360000	1340000	1510000	1530000	1160000	1220000	849000	1350000	1060000	1190000	217000	277000	1560000	1680000	275000	281000
Ammonia, Total (as N)	µg/L	1 310 - 18 400 [pH]	ns	6.1	7650	7590	8270	8640	**72400**	**70100**	2610	5470	**57200**	**57300**	<5.0	12.2	**131000**	**124000**	106	16.2
Bromide (Br)	µg/L	ns	ns	<250	1550	1560	1900	1940	<1000	1020	2040	2850	<1000	<1000	979	916	<1000	<1000	<250	<250
Chloride (Cl)	µg/L	1 500 000	250 000	8050	**401000**	**394000**	**395000**	**389000**	244000	236000	**254000**	**354000**	206000	205000	74200	75800	227000	222000	28500	42800
Fluoride (F)	µg/L	2 000@[H]< 50 mg/L 3 000@[H] > 50 mg/L	1 500	132	<400	<400	<400	<400	<400	<400	<400	<400	<400	<400	<100	<100	<400	<400	<100	<100
Nitrate (as N)	µg/L	400 000	10 000	110	<100	<100	<100	<100	<100	<100	1170	<100	<100	<100	164	74.8	<100	<100	196	78.6
Nitrite (as N)	µg/L	200@[Cl] < 2 mg/L, 400@[Cl] = 2 - < 4 mg/L, 600@[Cl] = 4 - < 6 mg/L, 800@[Cl] = 6 - < 8 mg/L, 1 000@[Cl] = 8 - < 10 mg/L, 2 000@[Cl] ≥10 mg/L,	1 000	<5.0	<20.0	<20.0	<20	<20	<20.0	<20	<20.0	<20	<20.0	<20	<5.0	<5	<20.0	<20	55.1	<5
Sulfate (SO4)	µg/L	1 280 000 @[H]=<30 mg/L 2 180 000 @[H] =31-75 mg/L 3 090 000 @[H] = 76-180 mg/L 4 290 000 @[H] >180 mg/L	500 000	49000	<6000	<6000	<6000	<6000	<6000	<6000	11000	<6000	<6000	<6000	36200	37600	<6000	<6000	44200	52400
Sulfate as S	µg/L	ns	ns	16,333	<2000	<2000	<2000	<2000	<2000	<2000	3,667	<2000	<2000	<2000	12,067	12,533	<2000	<2000	14,733	17,467
Dissolved Sulphur	µg/L	ns	ns	17900	3260	2050	2160	2390	2040	1540	5660	<2500	1080	<1000	12100	13600	1250	2120	-	-
Total Sulphur as S	µg/L	ns	ns	17500	3380	3050	3250	3020	3390	2040	5970	2720	1800	1890	13100	13900	2650	2680	16500	19700
Reduced Sulphur Compounds as S	µg/L	ns	ns	1167	<1,380	<1,050	<1250	<1020	<1,390	<40	2303	<720	<-200	<-110	1033	1367	<650	<680	1767	2233
Chemical Oxygen Demand (COD)	µg/L	ns	ns	19000	269000	260000	263000	260000	235000	202000	97000	158000	206000	183000	<10000	<10000	333000	324000	15000	17000
Total Inorganic Carbon	µg/L	ns	ns	163000	451000	440000	449000	516000	387000	406000	304000	416000	351000	372000	70300	81800	465000	513000	63900	71700
Total Organic Carbon	µg/L	ns	ns	7630	70400	73900	71500	72600	63800	57300	30600	47800	52000	47700	2400	3230	89600	84100	6860	5200
Total Carbon	µg/L	ns	ns	170,630	521,400	513,900	520,500	588,600	450,800	463,300	334,600	463,800	403,000	419,700	72,700	85,030	554,600	597,100	70,760	76,900
Calcium, Total	µg/L	ns	ns	132000	324000	315000	347000	332000	236000	247000	341000	420000	241000	251000	105000	116000	243000	257000	97700	111000
Iron, Total	µg/L	ns	ns	1060	13200	12800	13400	13400	52200	54400	7220	6640	55000	52700	237	2060	47400	63700	65	56
Magnesium, Total	µg/L	ns	ns	64100	184000	175000	192000	187000	80800	85500	112000	171000	80100	86400	29900	32700	118000	130000	19400	22400
Potassium, Total	µg/L	ns	ns	1970	18000	16900	20100	20300	69300	73500	8610	14400	55000	59600	2240	2570	96000	105000	2140	2960
Sodium, Total	µg/L	ns	ns	26400	331000	316000	351000	350000	204000	206000	101000	173000	184000	189000	20800	22500	254000	267000	15400	19200
Cation Sum	meq/L			13.06	46.17	44.30	48.90	47.70	29.07	30.20	30.85	42.93	28.03	29.38	8.66	9.52	35.34	37.82	7.20	8.29
Anion Sum	meq/L			10.32	38.51	37.91	41.34	41.57	30.09	31.06	24.36	36.99	27.01	29.58	6.45	8.46	37.60	39.86	6.32	7.91
Cation - Anion Balance				1.27	1.20	1.17	1.18	1.15	0.97	0.97	1.27	1.16	1.04	0.99	1.34	1.13	0.94	0.95	1.14	1.05

Indicates calculated value not presented in laboratory report

Indicates elevated electrical charge balance

Bold denotes exceedance of CSR Standards
CSR AW - Contaminated Sites Regulation, Aquatic Life standards
CSR DW - Contaminated Sites Regulation, Drinking Water standards
TDS - Total Dissolved Solids
ns - no standard
pH - standard pH dependant
Cl - standard is chloride dependent
H - standard is hardness dependent
SF - Soccer Field
CP - Concrete Plant
* - method detection limit (MDL) adjusted due to sample matrix interference
n/a - not applicable

Table 2: Groundwater Analytical Summary Table - General Chemistry and Field Data
2022 Annual Monitoring, Quesnel Municipal Landfill
KX05593

Parameter	Units	CSR		Regional Aquifer									
				MW05-10 (WL14)		MW08-8D		MW11-13D		SF		CP	
		AW	DW	17-Jun-2022	19-Oct-2022	17-Jun-2022	2-Nov-2022	17-Jun-2022	2-Nov-2022	17-Jun-2022	3-Nov-2022	17-Jun-2022	2-Nov-2022
Field pH	pH Units	ns	ns	7.1	8.4	7.16	7.36	7.87	7.95	8.39	8.44	8.39	8.35
Field Conductivity	mS/cm	ns	ns	1.441	7.23	1.970	1.270	0.487	0.362	0.254	0.204	0.254	0.199
Field Temperature	ºC	ns	ns	8.68	1.13	8.32	7.6	8.77	8	9.09	9.9	9.09	9.7
Field Dissolved Oxygen	mg/L	ns	ns	0.16	2.80	1.91	0.96	1.59	2.09	5.22	2.9	5.22	1.05
Field ORP	mV	ns	ns	197.9	79.1	-16.2	3.4	-23.9	26.2	-36.3	36	-36.3	16.4
Total Dissolved Solids	g/L	ns	ns	0.937	-	1.280	-	0.317	-	0.165	-	0.165	-
Routine Groundwater Quality Indicators													
Conductivity	uS/cm	ns	ns	1140	1550	1630	1850	505	554	271	302	271	290
Hardness (as CaCO3)	µg/L	ns	ns	723000	717000	972000	962000	253000	300000	138000	160000	138000	151000
pH	pH	ns	ns	8.22	7890	7.97	7.38	8.28	8.33	8.29	8.32	8.29	8.27
Total Dissolved Solids	µg/L	ns	ns	887000	1040000	1130000	1200000	289000	375000	164000	188000	164000	191000
Turbidity	NTU	ns	ns	0.25	<0.10	92.9	7.17	3.61	8.95	32.1	8.9	32.1	<0.10
Alkalinity, Bicarbonate (as CaCO3)	µg/L	ns	ns	329000	582000	585000	693000	212000	206000	123000	126000	123000	132000
Alkalinity, Carbonate (as CaCO3)	µg/L	ns	ns	<1000	<1000	<1000	<1000	<1000	6200	<1000	5200	<1000	<1000
Alkalinity, Hydroxide (as CaCO3)	µg/L	ns	ns	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity, Total (as CaCO3)	µg/L	ns	ns	329000	582000	585000	693000	212000	212000	123000	131000	123000	132000
Ammonia, Total (as N)	µg/L	1 310 - 18 400 [pH]	ns	8.4	6	<5.0	42.1	22.6	30.6	<5.0	6	<5.0	<5
Bromide (Br)	µg/L	ns	ns	<500	<500	<1000	697	<50	<50	<50	<50	<50	<50
Chloride (Cl)	µg/L	1 500 000	250 000	48300	98300	170000	169000	510	560	1560	2180	1560	860
Fluoride (F)	µg/L	2 000@[H]< 50 mg/L 3 000@[H] > 50 mg/L	1 500	<200	<200	<400	<200	43	43.00	40	36.00	40	41.00
Nitrate (as N)	µg/L	400 000	10 000	112	**23600**	<100	<50	460	288	149	142	149	60.2
Nitrite (as N)	µg/L	200@[Cl] < 2 mg/L, 400@[Cl] = 2 - < 4 mg/L, 600@[Cl] = 4 - < 6 mg/L, 800@[Cl] = 6 - < 8 mg/L, 1 000@[Cl] = 8 - < 10 mg/L, 2 000@[Cl] > 10 mg/L,	1 000	<10.0	93.6	<20.0	<10	13.0	1.40	<1.0	3.20	<1.0	13.70
Sulfate (SO4)	µg/L	1 280 000 @[H]=<30 mg/L 2 180 000 @[H] =31-75 mg/L 3 090 000 @[H] = 76-180 mg/L 4 290 000 @[H] >180 mg/L	500 000	242000	43500	84500	90200	64400	79600	17900	21200	17900	20100
Sulfate as S	µg/L	ns	ns	81000	15000	28,167	30,067	21,467	26,533	5,967	7,067	5,967	6,700
Dissolved Sulphur	µg/L	ns	ns	89700	18900	32600	35000	21000	28900	-	-	-	-
Total Sulphur as S	µg/L	ns	ns	87800	18400	33800	35900	21700	29500	4210	7480	4210	7070
Reduced Sulphur Compounds as S	µg/L	ns	ns	6,800	3,400	5633	5833	233	2967	-1757	413	-1757	370
Chemical Oxygen Demand (COD)	µg/L	ns	ns	<10000	15000	239000	27000	<10000	16000	<10000	<10000	<10000	<10000
Total Inorganic Carbon	µg/L	ns	ns	138000	181000	232000	216000	51000	58000	29700	34,600	29700	35,400
Total Organic Carbon	µg/L	ns	ns	2500	5060	47300	7880	1650	2440	610	900	610	<500
Total Carbon	µg/L	ns	ns	140,500	186,100	279,300	223,880	52,650	60,440	30,310	35,500	30,310	35,900
Calcium, Total	µg/L	ns	ns	152000	153000	246000	235000	62300	71200	37800	42500	37800	41700
Iron, Total	µg/L	ns	ns	<10	<10	2040	963	115	440	24800	2610	24800	14
Magnesium, Total	µg/L	ns	ns	83500	81,300	87000	91200	23700	29600	10600	13200	10600	11300
Potassium, Total	µg/L	ns	ns	3700	4,110	5130	5000	1350	1710	703	820	703	878
Sodium, Total	µg/L	ns	ns	58500	132,000	128000	108000	7910	10700	3540	3920	3540	4520
CationSum	meq/L	ns	ns	17.10	20.17	25.13	24.06	5.44	6.50	2.93	3.40	2.93	3.23
Anion Sum	meq/L	ns	ns	12.98	15.31	18.25	20.49	5.59	5.91	2.87	3.12	2.87	3.08
Cation - Anion Balance Calculated	Ratio	ns	ns	1.32	1.32	1.38	1.17	0.97	1.10	1.02	1.09	1.02	1.05

Indicates calculated value not presented in laboratory report

Indicates elevated electrical charge balance

Bold denotes exceedance of CSR Standards
CSR AW - Contaminated Sites Regulation, Aquatic Life standards
CSR DW - Contaminated Sites Regulation, Drinking Water standards
TDS - Total Dissolved Solids
ns - no standard
pH - standard pH dependant
Cl - standard is chloride dependent
H - standard is hardness dependent
SF - Soccer Field
CP - Concrete Plant
* - method detection limit (MDL) adjusted due to sample matrix interference
n/a - not applicable

Table 3: Groundwater Analytical Summary Table - Dissolved Metals
2022 Annual Monitoring, Quesnel Municipal Landfill
KX05593

Parameter	Units	CSR		Perched Aquifer															
				MW07-12	OW-1		OW-1		OW-6		OW-7		MW05-8S		MW11-13S		MW11-14		PM*	
		AW	DW	17-Jun-2022	17-Jun-2022	Field Duplicate (DUP 1)	02-Nov-2022	Field Duplicate (DUP 2)	17-Jun-2022	02-Nov-2022	17-Jun-2022	03-Nov-2022	17-Jun-2022	02-Nov-2022	17-Jun-2022	03-Nov-2022	17-Jun-2022	02-Nov-2022	17-Jun-2022	02-Nov-2022
Sulphur - T*	µg/L	ns	ns	17500	3380	3050	3250	3020	3390	2040	5970	2720	1800	1890	13100	13900	2650	2680	16500	19700
Aluminum	µg/L	ns	9,500	1	10.7	8.3	5.3	5.1	10.2	7.6	2.9	5	5.4	5.4	3.2	1.7	9.3	10.7	39.6	9.4
Antimony	µg/L	90	6	0.91	0.28	0.29	0.29	0.31	0.36	0.24	<0.20	<0.5	0.3	0.25	0.19	0.2	0.41	0.44	0.16	<0.1
Arsenic	µg/L	50	10	2.62	3.67	3.47	3.69	3.73	**27.5**	**28.4**	4.47	3.6	**30**	**20.8**	1	0.97	**30**	**28.1**	0.57	0.86
Barium	µg/L	10,000	1,000	134	**1500**	**1410**	**1420**	**1420**	**1010**	977	606	990	**1120**	**1130**	115	136	**1060**	**1080**	87.8	112
Beryllium	µg/L	1.5	8	<0.100	<0.100	<0.100	<0.1	<0.1	<0.100	<0.1	<0.100	<0.1	<0.100	<0.1	<0.100	<0.1	<0.100	<0.1	<0.100	<0.1
Bismuth	µg/L	ns	ns	<0.050	<0.100	<0.100	<0.1	<0.1	<0.050	<0.05	<0.100	<0.25	<0.050	<0.1	<0.050	<0.05	<0.100	<0.05	<0.050	<0.05
Boron	µg/L	12,000	5,000	<10	1400	1240	1090	1170	1190	956	190	342	1070	994	28	24	1740	1980	35	43
Cadmium	µg/L	0.5@[H] < 30, 1.5@[H] = 30 - < 90, 2.5@[H] = 90 - < 150, 3.5@[H] = 150 - < 210 4@[H]>= 210	5	0.0891	0.153	0.152	0.132	0.149	<0.0050	<0.005	0.0544	0.144	<0.0050	<0.01	0.0116	0.0131	<0.0100	<0.005	0.0348	0.10
Calcium	µg/L	ns	ns	124000	320000	305000	305000	311000	220000	218000	321000	373000	230000	240000	100000	102000	213000	237000	97700	111000
Cesium	µg/L	ns	ns	<0.010	<0.020	<0.020	<0.02	<0.02	0.113	0.096	<0.020	<0.05	0.056	0.044	<0.010	<0.01	0.249	0.234	<0.010	<0.01
Chromium	µg/L	90	6,000	<0.50	1.96	1.79	1.96	1.77	4.2	3.5	<0.50	0.81	2.82	2.78	<0.50	<0.5	4.33	4.38	<0.50	<0.5
Cobalt	µg/L	40	1	**2.02**	**14**	**14**	**14.3**	**14**	**4.73**	**4.53**	**7.18**	**12.1**	**9.28**	**10.1**	<0.10	<0.1	**6.02**	**6.03**	0.40	0.24
Copper	µg/L	20@[H]<50, 30@[H]=50-<75, 40@[H]=75-<100, 50@[H]=100-<125, 60@[H]=125-<150, 70@[H]=150-<175, 80@[H]=175-<200, 90@[H]>200	1,500	0.72	4.17	4.36	4.02	3.83	<0.20	<0.2	1.45	2.72	0.92	<0.4	1.56	1.56	<0.40	0.29	2.49	4.03
Iron	µg/L	ns	n/a	457	4020	3920	4280	4180	53100	52200	4430	4260	55000	53300	<10	<10	32500	33400	65	56
Lead	µg/L	40@H < 50, 50@H = 50 - < 100, 60@H = 100 - < 200, 110@H = 200 - < 300, 160@H > 300	10	<0.050	0.108	0.104	<0.1	<0.1	<0.050	<0.05	<0.100	<0.25	<0.050	<0.1	<0.050	<0.05	<0.100	<0.05	0.111	0.096
Lithium	µg/L	ns	8	4.8	7.6	8	7.3	7.4	**10.6**	**10.3**	**9**	**9.8**	**10.8**	**10.7**	1.9	1.3	**14.4**	**13.3**	2.0	2.5
Magnesium	µg/L	ns	ns	62500	178000	165000	176000	177000	79600	81300	102000	151000	77400	83200	27600	29800	110000	127000	19400	22400
Manganese	µg/L	ns	n/a	330	9020	8300	8470	8330	3800	3820	8820	10700	5140	5200	0.9	0.76	2620	2670	560	172
Mercury	µg/L	0.25	1	<0.0050	0.0199	0.0186	0.0187	0.0181	<0.0050	<0.005	0.0051	0.0136	<0.0050	<0.005	<0.0050	<0.005	<0.0050	<0.005	0.0068	<0.005
Molybdenum	µg/L	10,000	250	4.34	4.16	4.08	3.96	3.89	0.904	0.937	2.47	2.04	2.46	2.67	3.3	2.87	0.752	0.814	3.23	3.17
Nickel	µg/L	250@[H] < 60, 650@[H] = 60 - < 120, 1,100@[H] = 120 - < 180, 1,500@[H] > 180	80	4.43	**127**	**128**	**127**	**125**	25.8	26.7	46.8	76.1	34.2	36.7	<0.50	0.5	31.4	30.2	2.52	3.85
Phosphorus	µg/L	ns	ns	<50	122	104	108	124	376	418	<100	<250	272	216	56	<50	463	502	<50	<50
Potassium	µg/L	ns	ns	2140	17200	16300	16600	16900	72800	64400	8470	13000	55000	53000	2260	2300	89000	107000	2140	2960
Rubidium	µg/L	ns	ns	0.86	3.8	3.72	3.7	3.86	13.3	12.2	2.33	2.44	9.45	9.08	0.58	0.52	16.6	18.7	0.67	0.84
Selenium	µg/L	20	10	0.688	0.297	0.329	0.206	0.204	0.34	0.235	0.158	0.347	0.272	<0.1	1.28	1.48	0.225	0.238	0.238	0.121
Silicon	µg/L	ns	ns	10400	21200	19200	19500	19400	20900	22200	15600	16400	21700	20700	6880	6950	22100	24100	7510	8270
Silver	µg/L	0.5@[H] < 100, 15@[H] > 100	20	<0.010	0.024	0.029	<0.02	<0.02	0.02	0.012	<0.020	<0.05	0.015	<0.02	<0.010	<0.01	0.028	0.016	0.019	<0.01
Sodium	µg/L	ns	200,000	27000	**331000**	**319000**	**331000**	**326000**	**208000**	195000	93600	156000	182000	188000	21000	21000	**253000**	**269000**	15400	19200
Strontium	µg/L	ns	2,500	808	**3560**	**3420**	**3420**	**3370**	2150	2010	2240	3120	2110	2170	747	764	2500	**2550**	496	579
Sulphur	µg/L	ns	ns	17900	3260	2050	2160	2390	2040	1540	5660	<2500	1080	<1000	12100	13600	1250	2120	16500	19700
Tellurium	µg/L	ns	ns	<0.20	<0.40	<0.40	<0.4	<0.4	<0.20	<0.2	<0.40	<1	<0.20	<0.4	<0.20	<0.2	<0.40	<0.2	<0.20	<0.2
Thallium	µg/L	3	0.04	0.025	<0.020	<0.020	<0.02	<0.02	<0.010	<0.01	<0.020	<0.05	<0.010	<0.02	<0.010	0.01	<0.020	<0.01	0.012	<0.01
Thorium	µg/L	ns	ns	<0.10	<0.20	<0.20	<0.2	<0.2	<0.10	<0.1	<0.20	<0.5	<0.10	<0.2	<0.10	<0.1	<0.20	<0.1	<0.10	<0.1
Tin	µg/L	ns	2,500	<0.10	0.52	0.52	0.49	0.52	0.27	0.29	<0.20	<0.5	0.24	0.26	<0.10	<0.1	0.34	0.35	2.19	3.3
Titanium	µg/L	1,000	ns	<0.30	1.91	<1.80	1.67	1.84	5.44	3.79	0.78	<1.5	2.14	2.1	<0.30	<0.3	4.34	4.76	1.34	0.34
Tungsten	µg/L	ns	3	<0.10	0.32	0.33	0.33	0.32	0.23	0.22	<0.20	<0.5	0.16	<0.2	<0.10	<0.1	0.25	0.22	0.44	0.22
Uranium	µg/L	85	20	7.72	7.55	8.42	8.14	8.12	0.083	0.096	4.81	6.51	0.29	0.334	5.56	4.86	0.191	0.14	1.56	1.45
Vanadium	µg/L	ns	20	1.65	2.95	2.93	3.12	2.98	9.71	7.94	1.26	<2.5	6.06	5.7	0.68	0.7	9.55	9.79	0.77	0.5
Zinc	µg/L	75@[H] < 90, 150@[H] = 90 < 100, 900@[H] = 100 - < 200, 1,650@[H] = 200 - < 300, 2,400@[H] => 300	3,000	1.7	2.9	<2.0	2.1	2.3	1	<1	<2.0	<5	1.8	<2	3.4	3.6	<2.0	2.3	**3210**	1520
Zicronium	µg/L	ns	ns	0.26	7.11	7.07	7.02	6.96	8.78	7.43	2.72	4.85	6.99	7.57	<0.20	<0.2	8.77	8.1	<0.20	<0.2
Hardness	µg/L	ns	ns	567000	1530000	1440000	1660000	1600000	877000	969000	1220000	1750000	893000	982000	363000	424000	985000	1180000	324000	369000

Bold denotes exceedance of CSR Standards
CSR AW - Contaminated Sites Regulation, Aquatic Life standards
CSR DW - Contaminated Sites Regulation, Drinking Water standards

n/a = not applicable
SF - Soccer Field
CP - Concrete Plant
* - total metals

Table 3: Groundwater Analytical Summary Table - Dissolved Metals
2022 Annual Monitoring, Quesnel Municipal Landfill
KX05593

Parameter	Units	CSR		Regional Aquifer									
				MW05-10 (WL14)		MW08-8D		MW11-13D		SF		CP	
		AW	DW	17-Jun-2022	19-Oct-2022	17-Jun-2022	02-Nov-2022	17-Jun-2022	02-Nov-2022	17-Jun-2022	03-Nov-2022	17-Jun-2022	02-Nov-2022
Sulphur - T*	µg/L	ns	ns	87800	18400	33800	35900	21700	29500	4210	7480	8410	7070
Aluminum	µg/L	ns	9,500	1.4	1	10.4	1.9	2.8	2.2	27.0	10	<3.0	4.3
Antimony	µg/L	90	6	0.64	0.81	0.78	0.18	<0.10	<0.1	0.30	0	0.28	0.28
Arsenic	µg/L	50	10	0.29	0.33	1.49	1.47	1.76	2.26	2.11	2	0.86	0.9
Barium	µg/L	10,000	1,000	138	162	108	105	75.4	96.2	90.3	89	89.2	86.5
Beryllium	µg/L	1.5	8	<0.100	<0.1	<0.100	<0.1	<0.100	<0.1	<0.100	<0.1	<0.100	<0.1
Bismuth	µg/L	ns	ns	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05
Boron	µg/L	12,000	5,000	272	821	656	474	10	14	<10	<10	<10	<10
Cadmium	µg/L	0.5@[H] < 30, 1.5@[H] = 30 - < 90, 2.5@[H] = 90 - < 150, 3.5@[H] = 150 - < 210 4@[H]>= 210	5	0.430	0.335	0.0429	0.0248	<0.0050	<0.005	0.0243	0.0105	0.0104	0.0102
Calcium	µg/L	ns	ns	160000	153000	214000	218000	59500	64900	37800	42500	45900	41700
Cesium	µg/L	ns	ns	0.019	0.024	0.020	0.02	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01
Chromium	µg/L	90	6,000	<0.50	<0.5	<0.50	<0.5	<0.50	<0.5	8.77	2	<0.50	<0.5
Cobalt	µg/L	40	1	0.34	0.71	0.94	0.83	<0.10	<0.1	**1.02**	<0.1	<0.10	<0.1
Copper	µg/L	20@[H]<50, 30@[H]=50-<75, 40@[H]=75-<100, 50@[H]=100-<125, 60@[H]=125-<150, 70@[H]=150-<175, 80@[H]=175-<200, 90@[H]>200	1,500	2.64	8	0.84	0.36	0.31	0.21	19.5	2	1.92	1.32
Iron	µg/L	ns	n/a	<10	<10	313	427.00	29	35.00	24800	2610	<10	14
Lead	µg/L	40@H < 50, 50@H = 50 - < 100, 60@H = 100 - < 200, 110@H = 200 - < 300, 160@H > 300	10	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05	**25.9**	1	0.056	0.056
Lithium	µg/L	ns	8	3.0	3.8	3.2	2.2	1.2	<1	<1.0	<1	1.1	<1
Magnesium	µg/L	ns	ns	83900	79600	82200	91000	22900	27600	10600	13200	11800	11300
Manganese	µg/L	ns	n/a	804	225	722	859	145	187	343	12	39.0	38.2
Mercury	µg/L	0.25	1	<0.0050	<0.005	<0.0050	<0.005	<0.0050	0.031	<0.0050	<0.005	<0.0050	<0.005
Molybdenum	µg/L	10,000	250	7.73	7.17	4.11	3.08	1.66	1.66	0.857	1	1.79	1.73
Nickel	µg/L	250@[H] < 60, 650@[H] = 60 - < 120, 1,100@[H] = 120 - < 180, 1,500@[H] > 180	80	11.2	19.9	24.9	24.5	<0.50	<0.5	8.28	1	<0.50	<0.5
Phosphorus	µg/L	ns	ns	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Potassium	µg/L	ns	ns	3950	4340	5030	4760	1400	1490	703	820	881	878
Rubidium	µg/L	ns	ns	1.44	1.54	1.45	1.42	0.45	0.46	0.29	0	0.52	0.57
Selenium	µg/L	20	10	**14.0**	**65.8**	0.054	<0.05	<0.050	<0.05	0.390	1	1.19	1.55
Silicon	µg/L	ns	ns	8460	6230	9450	9600	7720	8720	4800	4300	4680	4430
Silver	µg/L	0.5@[H] < 100, 15@[H] > 100	20	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01	0.018	<0.01	<0.010	<0.01
Sodium	µg/L	ns	200,000	62800	125,000	127000	105000	7820	9730	3540	3920	4370	4520
Strontium	µg/L	ns	2,500	952	1,010	1010	1060	366	418	244	266	283	261
Sulphur	µg/L	ns	ns	89700	18900	32600	35000	21000	28900	4210	7480	8410	7070
Tellurium	µg/L	ns	ns	<0.20	<0.2	<0.20	<0.2	<0.20	<0.2	<0.20	<0.2	<0.20	<0.2
Thallium	µg/L	3	0.04	0.025	0.03	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01
Thorium	µg/L	ns	ns	<0.10	<0.1	<0.10	<0.1	<0.10	<0.1	<0.10	<0.1	<0.10	<0.1
Tin	µg/L	ns	2,500	<0.10	<0.1	0.16	<0.1	<0.10	<0.1	0.22	<0.1	<0.10	<0.1
Titanium	µg/L	1,000	ns	<0.30	<0.3	<0.60	<0.3	<0.30	<0.3	0.31	<0.3	<0.30	<0.3
Tungsten	µg/L	ns	3	<0.10	<0.1	<0.10	<0.1	<0.10	<0.1	<0.10	<0.1	<0.10	<0.1
Uranium	µg/L	85	20	7.07	7.13	10.4	7.91	0.841	1.1	0.605	1	0.650	0.576
Vanadium	µg/L	ns	20	<0.50	<0.5	<0.50	<0.5	<0.50	<0.5	6.15	3	2.98	2.85
Zinc	µg/L	75@[H] < 90, 150@[H] = 90 < 100, 900@[H] = 100 - < 200, 1,650@[H] = 200 - < 300, 2,400@[H] => 300	3,000	11.6	8	3.0	2.1	1.3	<1	10.1	<3	<3.0	<3
Zicronium	µg/L	ns	ns	<0.20	<0.2	0.31	0.28	<0.20	<0.2	<0.20	<0.2	<0.20	<0.2
Hardness	µg/L	ns	ns	745000	710000	873000	962000	243000	300000	138000	160000	163000	151000

Bold denotes exceedance of CSR Standards
CSR AW - Contaminated Sites Regulation, Aquatic Life standards
CSR DW - Contaminated Sites Regulation, Drinking Water standards

n/a = not applicable
SF - Soccer Field
CP - Concrete Plant
* - total metals

Table 4: Groundwater Analytical Summary Table - Hydrocarbons
2022 Annual Monitoring, Quesnel Municipal Landfill
KX05593

Parameter	Units	CSR		Perched Aquifer											Regional Aquifer	
				OW-1			OW-6		MW05-8S		MW11-14				MW05-10 (WL14)	
		AW	DW	17-Jun-2022	02-Nov-2022	Field Duplicate (DUP 2)	17-Jun-2022	02-Nov-2022	17-Jun-2022	02-Nov-2022	17-Jun-2022	Field Duplicate (DUP 1)	02-Nov-2022	Field Duplicate (DUP 2)	17-Jun-2022	19-Oct-2022
Benzene	ug/L	400	5	-	-	-	-	-	-	-	3.05	2.90	2.96	2.89	-	-
Ethylbenzene	ug/L	2000	140	-	-	-	-	-	-	-	<0.50	<0.50	<0.50	<0.50	-	-
Methyl t-butyl ether (MTBE)	ug/L	34000	95	-	-	-	-	-	-	-	1.71	1.64	1.72	1.8	-	-
Styrene	ug/L	720	800	-	-	-	-	-	-	-	<0.50	<0.50	<0.50	<0.50	-	-
Toluene	ug/L	5	60	-	-	-	-	-	-	-	<0.50	<0.50	1.07	0.83	-	-
ortho-Xylene	ug/L	ns	ns	-	-	-	-	-	-	-	<0.30	<0.30	<0.30	<0.30	-	-
meta- & para-Xylene	ug/L	ns	ns	-	-	-	-	-	-	-	<0.40	<0.40	0.65	0.51	-	-
Xylenes	ug/L	300	90	-	-	-	-	-	-	-	<0.50	<0.50	0.65	0.51	-	-
EPH (C_{10}-$C_{<19}$)	ug/L	5000	5000	<250	<250	<250	<250	<250	<250	<250	-	-	-	-	<250	<250
EPH (C_{19}-C_{32})	ug/L	ns	ns	460	<250	<250	<250	<250	<250	<250	-	-	-	-	<250	<250
LEPH	ug/L	500	ns	<250	<250	<250	<250	<250	<250	<250	-	-	-	-	-	-
HEPH	ug/L	ns	ns	460	<250	<250	<250	<250	<250	<250	-	-	-	-	-	-
VH (C6-C10)	ug/L	15000	15000	-	-	-	-	-	-	-	<100	<100	<100	<100	-	-
VPH	ug/L	1500	ns	-	-	-	-	-	-	-	<100	<100	<100	<100	-	-
Polycyclic Aromatic Hydrocarbons																
Acenaphthene	ug/L	60	250	<0.020	<0.020	<0.010	0.195	0.145	0.108	0.083	-	-	-	-	-	-
Acenaphthylene	ug/L	ns	ns	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-
Acridine	ug/L	0.5	ns	<0.040	0.014	0.018	<0.020	<0.010	<0.010	<0.010	-	-	-	-	-	-
Anthracene	ug/L	1	1000	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-
Benz(a)anthracene	ug/L	1	0.07	<0.030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-
Benzo(a)pyrene	ug/L	0.1	0.01	0.0171	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-
Benzo(b&j)fluoranthene	ug/L	ns	ns	0.030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-
Benzo(b+j+k)fluoranthene	ug/L	ns	ns	0.030	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	-	-	-	-	-	-
Benzo(g,h,i)perylene	ug/L	ns	ns	0.023	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-
Benzo(k)fluoranthene	ug/L	ns	ns	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-
Chrysene	ug/L	1	7	<0.060	0.027	0.017	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-
Dibenz(a,h)anthracene	ug/L	ns	ns	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-
Fluoranthene	ug/L	2	150	0.112	0.041	0.061	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-
Fluorene	ug/L	120	150	0.021	0.014	0.014	0.093	0.074	0.056	0.044	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	ug/L	ns	ns	0.014	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-
1-Methylnaphthalene	ug/L	ns	ns	<0.010	<0.010	<0.010	0.646	0.592	0.108	0.069	-	-	-	-	-	-
2-Methylnaphthalene	ug/L	ns	ns	<0.010	0.018	<0.010	0.036	0.025	0.033	0.025	-	-	-	-	-	-
Naphthalene	ug/L	10	80	<0.050	<0.050	<0.050	1.00	0.781	0.238	0.164	-	-	-	-	-	-
Phenanthrene	ug/L	3	ns	0.091	0.043	0.061	0.027	<0.020	<0.020	<0.020	-	-	-	-	-	-
Pyrene	ug/L	0.2	100	0.155	0.055	0.083	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-
Quinoline	ug/L	34	0.05	<0.050	<0.050	<0.050	<0.070	<0.050	<0.060	<0.050	-	-	-	-	-	-

Bold denotes exceedance of CSR Standards

CSR AW - Contaminated Sites Regulation, Aquatic Life standards

CSR DW - Contaminated Sites Regulation, Drinking Water standards

EPH - Extractable Petroleum Hydrocarbons

LEPH - Light Extractable Petroleum Hydrocarbons

HEPH - Heavy Extractable Petroleum Hydrocarbons

ns - no standard

*sampled in the spring under CPP's sampling program which included EPH, sampled in the fall under Landfill's sampling program which didn't include EPH.

Table 5: QA/QC Summary Table for Field Duplicate Samples
2022 Annual Monitoring, Quesnel Municipal Landfill
KX05593

Parameter	Units	MDL	PQL	Field Duplicate			Field Duplicate			Field Duplicate			Field Duplicate		
				OW-1	Field Duplicate (DUP 1)	RPD	MW11-14	Field Duplicate (DUP 1)	RPD	OW-1	Field Duplicate (DUP 2)	RPD	MW11-14	Field Duplicate (DUP 2)	RPD
				17-Jun-2022			17-Jun-2022			02-Nov-2022			02-Nov-2022		
Conductivity	uS/cm	2	10	3280	3250	0.9%	-	-	-	3550	3580	0.8%	-	-	-
Hardness (as CaCO3)	µg/L	500	2500	1570000	1510000	3.9%	-	-	-	1660000	1600000	3.7%	-	-	-
pH	pH	0.1	0.5	7.47	7.54	0.9%	-	-	-	7.05	7	0.7%	-	-	-
Total Dissolved Solids	µg/L	13000	65000	2160000	2120000	1.9%	-	-	-	2280000	2330000	2.2%	-	-	-
Turbidity	NTU	0.1	0.5	264	308	15.4%	-	-	-	220	226	2.7%	-	-	-
Alkalinity, Bicarbonate (as CaCO3)	µg/L	1000	5000	<1000	<1000	n/a	-	-	-	1510000	1530000	1.3%	-	-	-
Alkalinity, Carbonate (as CaCO3)	µg/L	1000	5000	<1000	<1000	n/a	-	-	-	<1000	<1000	n/a	-	-	-
Alkalinity, Hydroxide (as CaCO3)	µg/L	1000	5000	<1000	<1000	n/a	-	-	-	<1000	<1000	n/a	-	-	-
Alkalinity, Total (as CaCO3)	µg/L	1000	5000	1360000	1340000	1.5%	-	-	-	1510000	1530000	1.3%	-	-	-
Ammonia, Total (as N)	µg/L	5	25	7650	7590	0.8%	-	-	-	8270	8640	4.4%	-	-	-
Bromide (Br)	µg/L	50	250	1550	1560	0.6%	-	-	-	1900	1940	2.1%	-	-	-
Chloride (Cl)	µg/L	500	2500	401000	394000	1.8%	-	-	-	395000	389000	1.5%	-	-	-
Fluoride (F)	µg/L	20	100	<400	<400	n/a	-	-	-	<400	<400	n/a	-	-	-
Nitrate (as N)	µg/L	5	25	<100	<100	n/a	-	-	-	<100	<100	n/a	-	-	-
Nitrite (as N)	µg/L	1	-	<20	<20	n/a	-	-	-	<20	<20	n/a	-	-	-
Sulfate (SO4)	µg/L	300	1500	<6000	<6000	n/a	-	-	-	<6000	<6000	n/a	-	-	-
Dissolved Sulphur	µg/L	500	2500	3260	2050	n/a	-	-	-	2160	2390	n/a	-	-	-
Chemical Oxygen Demand (COD)	µg/L	20000	100000	269000	260000	3.4%	-	-	-	263000	260000	1.1%	-	-	-
Total Inorganic Carbon	µg/L	1000	5000	451000	440000	2.5%	-	-	-	449000	516000	13.9%	-	-	-
Total Organic Carbon	µg/L	500	2500	70400	73900	4.9%	-	-	-	71500	72600	1.5%	-	-	-
Total Carbon	µg/L	1500	7500	521400	513900	1.4%	-	-	-	520500	588600	12.3%	-	-	-
Metals															
Sulphur - T	ug/L	500	2500	3380	3050	10.3%	-	-	-	3250	3020	7.3%	-	-	-
Aluminum	ug/L	1	5	10.7	8.3	**25.3%**	-	-	-	5.3	5.1	3.8%	-	-	-
Antimony	ug/L	0.1	0.5	0.28	0.29	n/a	-	-	-	0.29	0.31	n/a	-	-	-
Arsenic	ug/L	0.1	0.5	3.67	3.47	5.6%	-	-	-	3.69	3.73	1.1%	-	-	-
Barium	ug/L	0.1	0.5	1500	1410	6.2%	-	-	-	1420	1420	0.0%	-	-	-
Beryllium	ug/L	0.1	0.5	<100000	<100000	n/a	-	-	-	<0.1	<0.1	n/a	-	-	-
Bismuth	ug/L	0.05	0.25	<100000	<100000	n/a	-	-	-	<0.1	<0.1	n/a	-	-	-
Boron	ug/L	10	50	1400	1240	12.1%	-	-	-	1090	1170	7.1%	-	-	-
Cadmium	ug/L	0.005	0.025	0.153	0.152	0.7%	-	-	-	0.132	0.149	12.1%	-	-	-
Calcium	mg/L	50	250	320000	305000	4.8%	-	-	-	305000	311000	1.9%	-	-	-
Cesium	ug/L	0.01	0.05	<20000	<20000	n/a	-	-	-	<0.02	<0.02	n/a	-	-	-
Chromium	ug/L	0.1	0.5	1.96	1.79	9.1%	-	-	-	1.96	1.77	10.2%	-	-	-
Cobalt	ug/L	0.1	0.5	14	14	0.0%	-	-	-	14.3	14	2.1%	-	-	-
Copper	ug/L	0.2	1	4.17	4.36	4.5%	-	-	-	4.02	3.83	4.8%	-	-	-
Iron	ug/L	10	50	4020	3920	2.5%	-	-	-	4280	4180	2.4%	-	-	-
Lead	ug/L	0.05	0.25	0.108	0.104	n/a	-	-	-	<0.1	<0.1	n/a	-	-	-
Lithium	ug/L	1	5	7.6	8	5.1%	-	-	-	7.3	7.4	1.4%	-	-	-
Magnesium	ug/L	5	25	178000	165000	7.6%	-	-	-	176000	177000	0.6%	-	-	-
Manganese	ug/L	0.1	0.5	9020	8300	8.3%	-	-	-	8470	8330	1.7%	-	-	-
Mercury	ug/L	0.005	0.025	0.0199	0.0186	n/a	-	-	-	0.0187	0.0181	n/a	-	-	-
Molybdenum	ug/L	0.05	0.25	4.16	4.08	1.9%	-	-	-	3.96	3.89	1.8%	-	-	-
Nickel	ug/L	0.5	2.5	127	128	0.8%	-	-	-	127	125	1.6%	-	-	-
Phosphorus	ug/L	50	250	122	104	n/a	-	-	-	108	124	n/a	-	-	-
Potassium	ug/L	50	250	17200	16300	5.4%	-	-	-	16600	16900	1.8%	-	-	-
Rubidium	ug/L	0.2	1	3.8	3.72	2.1%	-	-	-	3.7	3.86	4.2%	-	-	-
Selenium	ug/L	0.05	0.25	0.297	0.329	10.2%	-	-	-	0.206	0.204	n/a	-	-	-
Silicon	ug/L	50	250	21200	19200	9.9%	-	-	-	19500	19400	0.5%	-	-	-
Silver	ug/L	0.01	0.05	0.024	0.029	n/a	-	-	-	<0.02	<0.02	n/a	-	-	-
Sodium	ug/L	50	250	331000	319000	3.7%	-	-	-	331000	326000	1.5%	-	-	-
Strontium	ug/L	0.2	1	3560	3420	4.0%	-	-	-	3420	3370	1.5%	-	-	-
Sulphur	ug/L	500	2500	3260	2050	n/a	-	-	-	2160	2390	n/a	-	-	-
Tellurium	ug/L	0.2	1	<0.4	<0.4	n/a	-	-	-	<0.4	<0.4	n/a	-	-	-
Thallium	ug/L	0.01	0.05	<20000	<20000	n/a	-	-	-	<0.02	<0.02	n/a	-	-	-
Thorium	ug/L	0.1	0.5	<0.2	<0.2	n/a	-	-	-	<0.2	<0.2	n/a	-	-	-
Tin	ug/L	0.1	0.5	0.52	0.52	0.0%	-	-	-	0.49	0.52	n/a	-	-	-
Titanium	ug/L	0.3	1.5	1.91	<1.8	n/a	-	-	-	1.67	1.84	9.7%	-	-	-
Tungsten	ug/L	0.1	0.5	0.32	0.33	n/a	-	-	-	0.33	0.32	n/a	-	-	-
Uranium	ug/L	0.01	0.05	7.55	8.42	10.9%	-	-	-	8.14	8.12	0.2%	-	-	-
Vanadium	ug/L	0.5	2.5	2.95	2.93	0.7%	-	-	-	3.12	2.98	4.6%	-	-	-
Zinc	ug/L	1	5	2.9	<2	n/a	-	-	-	2.1	2.3	n/a	-	-	-
Zirconium	ug/L	0.2	1	7.11	7.07	0.6%	-	-	-	7.02	6.96	0.9%	-	-	-
Hydrocarbons															
Benzene	ug/L	0.5	2.5	-	-	-	3.05	2.90	5.0%	-	-	-	2.96	2.89	2.4%
Ethylbenzene	ug/L	0.5	2.5	-	-	-	<0.50	<0.50	n/a	-	-	-	<0.50	<0.50	n/a
Methyl t-butyl ether (MTBE)	ug/L	0.5	2.5	-	-	-	1.71	1.64	4.2%	-	-	-	1.72	1.8	n/a
Styrene	ug/L	0.5	2.5	-	-	-	<0.50	<0.50	n/a	-	-	-	<0.50	<0.50	n/a
Toluene	ug/L	0.45	2.25	-	-	-	<0.50	<0.50	n/a	-	-	-	1.07	0.83	n/a
ortho-Xylene	ug/L	0.5	2.5	-	-	-	<0.30	<0.30	n/a	-	-	-	<0.30	<0.30	n/a
meta- & para-Xylene	ug/L	0.5	2.5	-	-	-	<0.40	<0.40	n/a	-	-	-	0.65	0.51	n/a
Xylenes	ug/L	0.75	3.75	-	-	-	<0.50	<0.50	n/a	-	-	-	0.65	0.51	n/a
EPH (C10-C<19)	ug/L	0.1	0.5	<250	-	-	-	-	-	<250	<250	n/a	-	-	-
EPH (C19-C32)	ug/L	0.1	0.5	460	-	-	-	-	-	<250	<250	n/a	-	-	-
LEPH	ug/L	0.25	1.25	<250	-	-	-	-	-	<250	<250	n/a	-	-	-
HEPH	ug/L	0.25	1.25	460	-	-	-	-	-	<250	<250	n/a	-	-	-
VH (C6-C10)	ug/L	0.25	1.25	-	-	-	<100	<100	n/a	-	-	-	<100	<100	n/a
VPH	ug/L	0.25	1.25	-	-	-	<100	<100	n/a	-	-	-	<100	<100	n/a
Polycyclic Aromatic Hydrocarbons															
Acenaphthene	ug/L	0.01	0.05	<0.020	-	-	-	-	-	<0.020	<0.010	n/a	-	-	-
Acridine	ug/L	0.01	0.05	<0.040	-	-	-	-	-	0.014	0.018	n/a	-	-	-
Anthracene	ug/L	0.010	0.05	<0.020	-	-	-	-	-	<0.010	<0.010	n/a	-	-	-
Benz(a)anthracene	ug/L	0.010	0.05	<0.030	-	-	-	-	-	<0.010	<0.010	n/a	-	-	-
Benzo(a)pyrene	ug/L	0.005	0.025	0.0171	-	-	-	-	-	<0.0050	<0.0050	n/a	-	-	-
Chrysene	ug/L	0.01	0.05	<0.060	-	-	-	-	-	0.027	0.017	n/a	-	-	-
Fluoranthene	ug/L	0.01	0.05	0.112	-	-	-	-	-	0.041	0.061	n/a	-	-	-
Fluorene	ug/L	0.01	0.05	0.021	-	-	-	-	-	0.014	0.014	n/a	-	-	-
Naphthalene	ug/L	0.05	0.25	<0.050	-	-	-	-	-	<0.050	<0.050	n/a	-	-	-
Phenanthrene	ug/L	0.02	0.1	0.091	-	-	-	-	-	0.043	0.061	n/a	-	-	-
Pyrene	ug/L	0.01	0.05	0.155	-	-	-	-	-	0.055	0.083	**40.6%**	-	-	-
Quinoline	ug/L	0.05	0.25	<0.050	-	-	-	-	-	<0.050	<0.050	n/a	-	-	-

< Less than method detection limit
n/a - < Practical Quantitation Limit (PQL = 5 x MDL)
MDL - Laboratory Method Detection Limit
RPD - Relative Percent Difference

	Indicates calculated value not presented in the laboratory report.
Bold	Denotes elevated RPD value

Table 6: Soil Gas Monitoring Summary Table
2022 Annual Monitoring, Quesnel Municipal Landfill
KX05593

Parameter	Well ID	OW-1		MW07-11		MW07-12		OW-6		OW-7		MW11-13S		MW11-13D		MW11-14		MW05-08S		MW05-10
	Depth of Screen (m)	3.0 - 23.0		1.2 - 3.1		1.2 - 2.5		9.5 - 21.6	16.6 - 28.7	11.3 - 23.5		8.5 - 11.6		59.5 - 64		7.5 - 10.5		15.9-18.9		29-35
	Date	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	15-Jun-2022
	Water Level (m btoc)	10.985	11.12	3.675	DRY	2.49	DRY	8.51	15.834	10.96	11.091	11.411	11.396	57.42	57.75	9.267	9.41	15.556	15.734	28.8
CH4 (% by volume)	Peak	***44.4***	***11.5***	0	0.1*	0	0.1*	0	0.4	***17.5***	***5.7***	0	0.1*	0	0.1*	0.1	0.7	0	0.1*	0
	Stabilized	***44.4***	***11.6***	0	0.1*	0	0.1*	0	0.4	**13**	***5.8***	0	0.1*	0	0.1*	0	0.6	0	0.1*	0
CO2 (% by volume)	Peak	32.1	7.8	1.1	0.2	2.1	0.1*	0	0.4	18	5.7	0	0.4	0.6	0.2	0.2	1.5	0	0.1	0.1
	Stabilized	32.1	7.8	1.1	0.2	0.6	0.1	0	0.4	13.1	5.7	0	0.4	0.5	0.2	0.2	1.5	0	0.1	0.1
O2 (% by volume)	Peak	0.8	17.9	18.9	21.7	20	20.4	19.9	21.7	2.3	18.2	21	21	15.7	21.1	20.6	20.7	21	22.4	19.9
	Stabilized	0.7	17.8	18.9	21.7	18.6	20.5	19.9	21.6	6.9	18.1	21	20.9	16.6	21.1	20.6	20.3	21	22.4	19.9
Balance (% by volume)	Peak	22.8	63	80	78	79.4	79.4	80.1	77.6	62.1	70.6	78.9	78.5	83.7	78.6	79.2	77.4	79	77.4	76.8
	Stabilized	22.6	62.8	80.1	77.9	79.5	79.2	80.1	77.6	66.8	70.3	78.9	78.6	82.9	78.7	79.2	77.5	79	77.4	76.6
% LEL	Peak	>>>	>>>	0	2	0	2	0	8	>>>	>>>	0	2	0	2	2	14	0	2	0
	Stabilized	>>>	>>>	0	2	0	2	0	8	>>>	>>>	0	2	0	2	0	12	0	2	0
H_2S (ppm)	Peak	0	1	1		0	0	1	0	3	0	0	0	0	0	0	0	2*	0	0
	Stabilized	0	1	0		0	0	1	0	3	0	0	0	0	0	0	0	2	0	0
CO (% by volume)	Peak	4	2	2	1	1	0	1	5	2	1	1	0	1	1	1	0	1	0	1
	Stabilized	4	1	1	0	1	0	1	5	2	1	1	0	1	0	1	0	1	0	0

Parameter	Well ID	MW08-08D		Swap Shop		White Dome (Recycle Centre)		Scale House		Under the Scale House		SVP12-A		SVP12-C	BH20-A		BH20-B		BH20-C(s)	
	Depth of Screen (metres)	58 - 61		NA		NA		NA		NA		1.37 - 1.67		1.9 - 2.2	5.0-9.5		5.5-8.5m		2.5-5.5	
	Date	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022
	Water Level (m btoc)	58.109	58.6	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
CH4 (% by volume)	Peak	0	0.1*	0.1	0.2	0	0.1*	0	0.1*	0	0.2*	0	0.2	***56.8***	***34.9***	4.6	***32.5***	***6.3***	***28.6***	***9.8***
	Stabilized	0	0.1*	0	0.1	0	0.1*	0	0.1*	0	0.2*	0	0.2	***56.8***	***34.9***	4.5	***32.5***	***6.3***	***28.6***	***9.8***
CO2 (% by volume)	Peak	0	0.1	0	0.1	0	0.1*	0	0.3*	0	0.2*	1	0.1	36.2	27.4	4.2	25.6	5	27.5	8.2
	Stabilized	0	0.1	0	0.1	0	0.1	0	0.2	0	0.1	0.9	0.1	36.2	27.4	4.1	25.6	4.9	27.5	8.2
O2 (% by volume)	Peak	20.9	22.3	21.5	21.3	21.4	21.2	21.3	21.1	21.4	21.4	20	22.7	0.5	1.3	19.9	1.2	18.4	0.4	16.4
	Stabilized	21	22.3	21.5	21.3	21.4	21.3	21.3	21.1	21.5	21.5	20.1	22.7	0.5	1.3	19	1.2	18.3	0.4	16.4
Balance (% by volume)	Peak	79.1	77.4	78.5	78.4	78.6	78.5	78.7	78.6	78.6	78.2	79	77	6.5	36	72	40.7	70.3	43.4	65.6
	Stabilized	79	77.4	78.5	78.4	78.6	78.5	78.7	78.6	78.5	78.2	79	77	6.5	36	72.3	40.7	70.5	43.4	65.6
% LEL	Peak	0	2	2	4	0	2	0	2	0	4	0	4	>>>	>>>	92	>>>	>>>	>>>	>>>
	Stabilized	0	2	0	2	0	2	0	2	0	4	0	4	>>>	>>>	90	>>>	>>>	>>>	>>>
H_2S (ppm)	Peak	2**	0	2**	0	2**	0	2	0	2	0	3	0	4	2	0	2	0	2	0
	Stabilized	2	0	2	0	2	0	2	0	2	0	2	0	3	2	0	2	0	2	0
CO (% by volume)	Peak	1	0	1	3**	1	3**	2	3	1	1	5	0	6	6	2	10	2	3	1
	Stabilized	1	0	1	2	1	3	2	3	1	1	1	0	3	5	2	8	2	3	1

Parameter	Well ID	BH20-C(d)		BH20-D		BH20-E		BH20-F(s)		BH20-F(d)		BH20-G(s)		BH20-G(d)		BH20-H		BH20-I	
	Depth of Screen (m)	5.5-10		6.0-12		6.0-12		2.5-5.5		6.0-12		2.5-5.5		6.0-12		6.0-12		6.0-12	
	Date	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022	16-Jun-2022	2-Nov-2022
	Water Level (m btoc)	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
CH4 (% by volume)	Peak	***24.5***	***6.2***	***24.5***	***7.3***	***45.6***	***14.8***	***46.2***	***6.4***	***52.7***	***11.9***	***48***	***7.4***	***32.9***	***5.8***	***28.9***	3.2	0.4	0.1
	Stabilized	***24.5***	***6.1***	***22.6***	***7.1***	***45.6***	***14.8***	***46.2***	***6.6***	***52.7***	***11.9***	***48***	***7.4***	***32.9***	***5.7***	***28.9***	3.2	0	0.1
CO2 (% by volume)	Peak	23.3	7.3	30.3	6.7	33.3	10.4	34.3	6.5	37	8.5	35.3	5.6	24.3	4.9	24	3.3	1.4	0.8
	Stabilized	23.3	7.3	29.1	6.7	33.3	10.4	34.3	6.7	37	8.5	35.3	5.6	24.3	4.9	24	3.3	1.2	0.7
O2 (% by volume)	Peak	1.5	16.4	4.2	18.5	1.5	15.6	0.5	18.4	0.3	18.3	0	18	2	18	2.3	20	19.1	20.5
	Stabilized	1.5	16.3	4.4	18.5	1.5	15.6	0.5	18.3	0.3	18.3	0	18	2	18	2.3	19.1	16.8	20.5
Balance (% by volume)	Peak	50	70.2	42.1	67.6	19.1	59.2	19.2	68.6	10.1	61.3	16.2	68.8	40.8	71.4	45	74	79.8	78.7
	Stabilized	50	70.2	43.9	67.7	19.1	59.1	19.2	68.5	10.1	61.3	16.2	69	40.8	71.4	45	74.6	79.6	78.l7
% LEL	Peak	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	64	8	2
	Stabilized	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	>>>	64	0	2
H_2S (ppm)	Peak	3	0	3	0	3	0	0	0	2	0	2	0	3	0	2	0	1	0
	Stabilized	3	0	3	0	3	0	0	0	2	0	2	0	3	0	2	0	1	0
CO (% by volume)	Peak	3	1	3	1	6	2	3	1	5	1	4	7	8	7	7	1	2	0
	Stabilized	2	1	3	0	4	1	3	1	4	1	3	6	7	7	5	0	2	0

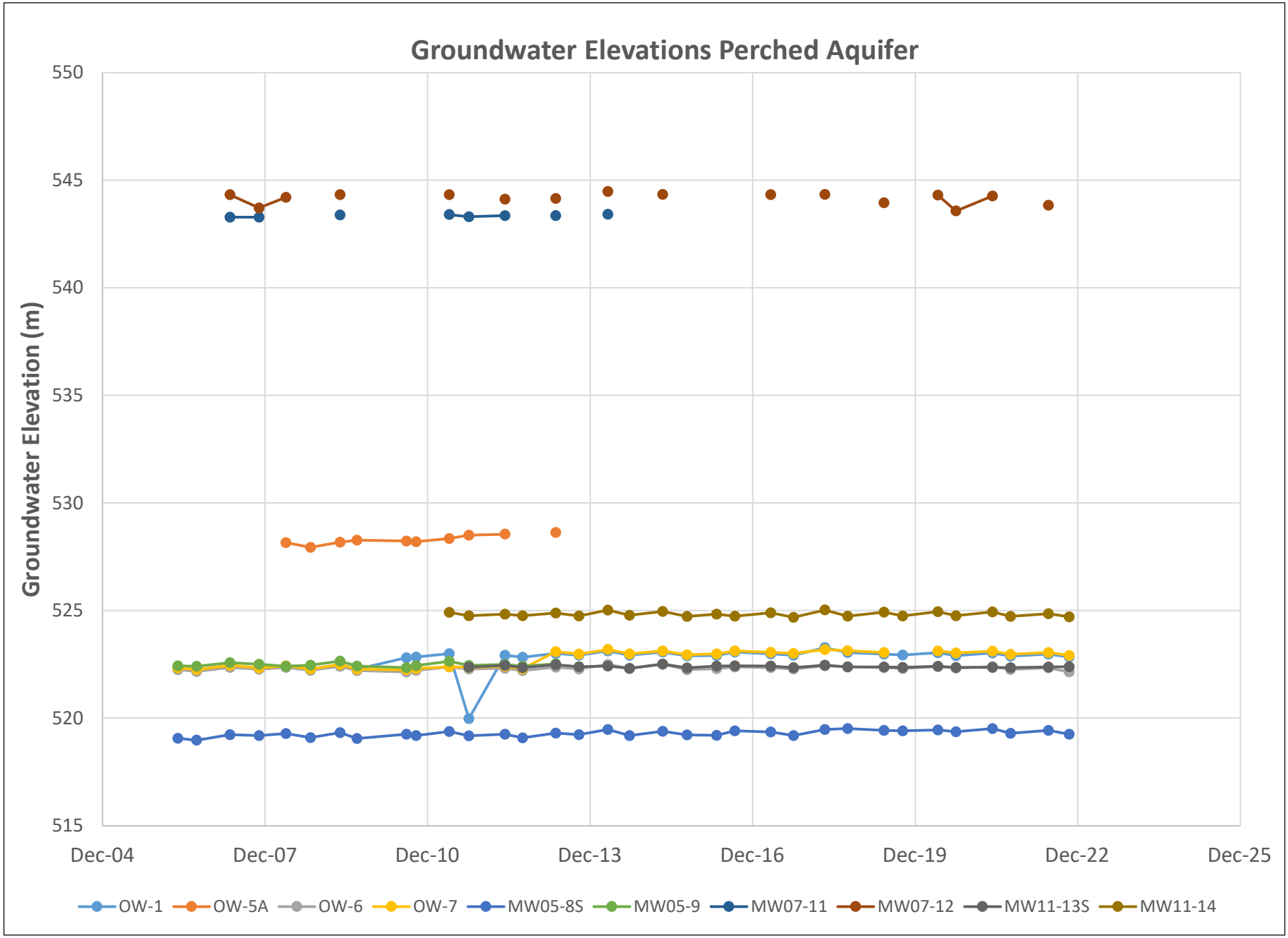
Bold indicates concentrations above the Lower Explosive Limit (LEL) of Methane (5% by volume at 20°C).

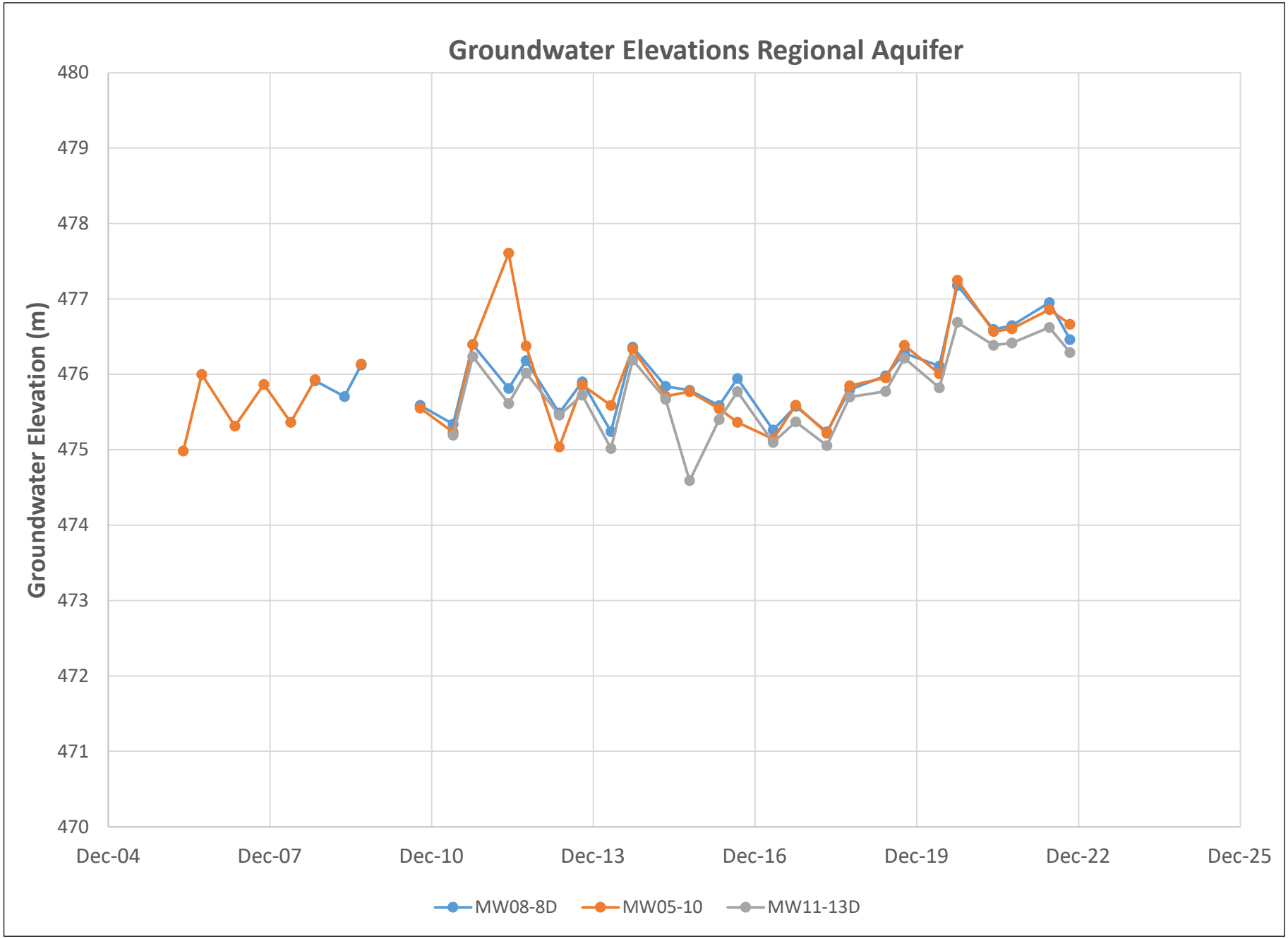
Italicized indicates concentrations above the Upper Explosive Limit (UEL) of Methane (15% by volume at 20°C).

>>> above the LEL (5%) of methane
Peak - initial peak concentration recorded
Stabilized - stable concentration recorded
Soil Vapour Probes (SVP) SVP12-D,E,F,G,H,I and J have been destroyed
SVP12-C was not accessible in November
* GEM would not zero, started reading with a concentration of 0.1%
**GEM would not zero, started reading with a concentration of 2.
BH20 series wells were installed by Sperling Hansen Associates in Fall 2020
-' denotes no data available

Appendix F

Hydrographs


Groundwater Elevations Perched Aquifer
Groundwater Elevation (m)
550
545
540
535
530
525
520
515
Dec-04
Dec-07
Dec-10
Dec-13
Dec-16
Dec-19
Dec-22
Dec-25
OW-1
OW-5A
OW-6
OW-7
MW05-8S
MW05-9
MW07-11
MW07-12
MW11-13S
MW11-14


Groundwater Elevations Regional Aquifer
Groundwater Elevation (m)
480
479
478
477
476
475
474
473
472
471
470
Dec-04
Dec-07
Dec-10
Dec-13
Dec-16
Dec-19
Dec-22
Dec-25
MW08-8D
MW05-10
MW11-13D

Appendix G

Laboratory Analytical Reports

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **KS2202212**	Page	: 1 of 15
Client	: **Wood Environment & Infrastructure Solutions Canada Limited**	Laboratory	: Kamloops - Environmental
Contact	: Maylee Eisbrenner	Account Manager	: Selam Worku
Address	: 3456 Opie Crescent Prince George BC Canada V2N 2P9	Address	: 1445 McGill Road, Unit 2B Kamloops BC Canada V2C 6K7
Telephone	: 250 564 3243	Telephone	: +1 250 372 3588
Project	: KX05593.2.****	Date Samples Received	: 20-Jun-2022 15:40
PO	: GL Code: 5730 Org:1110	Date Analysis Commenced	: 22-Jun-2022
C-O-C number	: 20-993494	Issue Date	: 06-Jul-2022 23:15
Sampler	: ----		
Site	: ----		
Quote number	: BC Standard Pricing		
No. of samples received	: 13		
No. of samples analysed	: 13		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Ann Joby	Lab Assistant	Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Organics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, 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
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DLQ	*Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.*
HTP	*Sample preparation or preservation hold time was exceeded.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	OW1	OW6	OW-7	MW05-08S	MW08-8D
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
						KS2202212-001	KS2202212-002	KS2202212-003	KS2202212-004	KS2202212-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		1360	1160	849	1060	585
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		1360	1160	849	1060	585
conductivity	----	E100	2.0	µS/cm		3280	2720	2140	2450	1630
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		1530	877	1220	893	873
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		1570	922	1310	932	972
pH	----	E108	0.10	pH units		7.47	7.54	7.44	7.70	7.97
solids, total dissolved [TDS]	----	E162	10	mg/L		2160	1470	1530	1390	1130
turbidity	----	E121	0.10	NTU		264	380	68.0	257	92.9
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		7.65	72.4	2.61	57.2	<0.0050
bromide	24959-67-9	E235.Br-L	0.050	mg/L		1.55	<1.00 DLDS	2.04	<1.00 DLDS	<1.00 DLDS
chloride	16887-00-6	E235.Cl	0.50	mg/L		401	244	254	206	170
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.400 DLDS	<0.400 DLDS	<0.400 DLDS	<0.400 DLDS	<0.400 DLDS
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.100 DLDS	<0.100 DLDS	1.17	<0.100 DLDS	<0.100 DLDS
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0200 DLDS	<0.0200 DLDS	<0.0200 DLDS	<0.0200 DLDS	<0.0200 DLDS
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		<6.00 DLDS	<6.00 DLDS	11.0	<6.00 DLDS	84.5
Organic / Inorganic Carbon										
carbon, total inorganic [TIC]	----	E354-L	0.50	mg/L		451	387	304	351	232
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		70.4	63.8	30.6	52.0	47.3
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		324	236	341	241	246
iron, total	7439-89-6	E420	0.010	mg/L		13.2	52.2	7.22	55.0	2.04
magnesium, total	7439-95-4	E420	0.0050	mg/L		184	80.8	112	80.1	87.0
potassium, total	7440-09-7	E420	0.050	mg/L		18.0	69.3	8.61	55.0	5.13
sodium, total	7440-23-5	E420	0.050	mg/L		331	204	101	184	128
sulfur, total	7704-34-9	E420	0.50	mg/L		3.38	3.39	5.97	1.80	33.8
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0107	0.0102	0.0029	0.0054	0.0104

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	OW1	OW6	OW-7	MW05-08S	MW08-8D
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
						KS2202212-001	KS2202212-002	KS2202212-003	KS2202212-004	KS2202212-005
						Result	Result	Result	Result	Result
Dissolved Metals										
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00028	0.00036	<0.00020 DLA	0.00030	0.00078
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00367	0.0275	0.00447	0.0300	0.00149
barium, dissolved	7440-39-3	E421	0.00010	mg/L		1.50	1.01	0.606	1.12	0.108
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000100 DLA	<0.000050	<0.000100 DLA	<0.000050	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L		1.40	1.19	0.190	1.07	0.656
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.000153	<0.0000050	0.0000544	<0.0000050	0.0000429
calcium, dissolved	7440-70-2	E421	0.050	mg/L		320	220	321	230	214
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000020 DLA	0.000113	<0.000020 DLA	0.000056	0.000020
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		0.00196	0.00420	<0.00050	0.00282	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.0140	0.00473	0.00718	0.00928	0.00094
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00417	<0.00020	0.00145	0.00092	0.00084
iron, dissolved	7439-89-6	E421	0.010	mg/L		4.02	53.1	4.43	55.0	0.313
lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000108	<0.000050	<0.000100 DLA	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0076	0.0106	0.0090	0.0108	0.0032
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		178	79.6	102	77.4	82.2
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		9.02	3.80	8.82	5.14	0.722
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		0.0000199	<0.0000050	0.0000051	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00416	0.000904	0.00247	0.00246	0.00411
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.127	0.0258	0.0468	0.0342	0.0249
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		0.122	0.376	<0.100 DLA	0.272	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		17.2	72.8	8.47	55.0	5.03
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00380	0.0133	0.00233	0.00945	0.00145
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000297	0.000340	0.000158	0.000272	0.000054
silicon, dissolved	7440-21-3	E421	0.050	mg/L		21.2	20.9	15.6	21.7	9.45
silver, dissolved	7440-22-4	E421	0.000010	mg/L		0.000024	0.000020	<0.000020 DLA	0.000015	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L		331	208	93.6	182	127
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		3.56	2.15	2.24	2.11	1.01
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		3.26	2.04	5.66	1.08	32.6
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00040 DLA	<0.00020	<0.00040 DLA	<0.00020	<0.00020
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000020 DLA	<0.000010	<0.000020 DLA	<0.000010	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00020 DLA	<0.00010	<0.00020 DLA	<0.00010	<0.00010

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	OW1	OW6	OW-7	MW05-08S	MW08-8D
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
						KS2202212-001	KS2202212-002	KS2202212-003	KS2202212-004	KS2202212-005
						Result	Result	Result	Result	Result
Dissolved Metals										
tin, dissolved	7440-31-5	E421	0.00010	mg/L		0.00052	0.00027	<0.00020 DLA	0.00024	0.00016
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		0.00191	0.00544	0.00078	0.00214	<0.00060 DLM
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		0.00032	0.00023	<0.00020 DLA	0.00016	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00755	0.000083	0.00481	0.000290	0.0104
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00295	0.00971	0.00126	0.00606	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0029	0.0010	<0.0020 DLA	0.0018	0.0030
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		0.00711	0.00878	0.00272	0.00699	0.00031
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		269	235	97	206	239
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	----	<250	----
EPH (C19-C32)	----	E601A	250	µg/L		460	<250	----	<250	----
HEPHw	----	EC600A	250	µg/L		460	<250	----	<250	----
LEPHw	----	EC600A	250	µg/L		<250	<250	----	<250	----
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		97.5	97.3	----	95.0	----
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L		<0.020 DLCI	0.195	----	0.108	----
acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	----	<0.010	----
acridine	260-94-6	E641A	0.010	µg/L		<0.040 DLCI	<0.020 DLCI	----	<0.010	----
anthracene	120-12-7	E641A	0.010	µg/L		<0.020 DLQ	<0.010	----	<0.010	----
benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.030 DLCI	<0.010	----	<0.010	----
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		0.0171	<0.0050	----	<0.0050	----
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		0.030	<0.010	----	<0.010	----
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		0.030	<0.015	----	<0.015	----
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		0.023	<0.010	----	<0.010	----
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	----	<0.010	----
chrysene	218-01-9	E641A	0.010	µg/L		<0.060 DLCI	<0.010	----	<0.010	----
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	----	<0.0050	----
fluoranthene	206-44-0	E641A	0.010	µg/L		0.112	<0.010	----	<0.010	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	OW1	OW6	OW-7	MW05-08S	MW08-8D
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
Analyte	CAS Number	Method	LOR	Unit		KS2202212-001	KS2202212-002	KS2202212-003	KS2202212-004	KS2202212-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
fluorene	86-73-7	E641A	0.010	µg/L		0.021	0.093	----	0.056	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		0.014	<0.010	----	<0.010	----
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	0.646	----	0.108	----
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	0.036	----	0.033	----
naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	1.00	----	0.238	----
phenanthrene	85-01-8	E641A	0.020	µg/L		0.091	0.027	----	<0.020	----
pyrene	129-00-0	E641A	0.010	µg/L		0.155	<0.010	----	<0.010	----
quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.070 DLCI	----	<0.060 DLCI	----
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%		110	118	----	119	----
naphthalene-d8	1146-65-2	E641A	0.1	%		99.8	109	----	102	----
phenanthrene-d10	1517-22-2	E641A	0.1	%		98.9	109	----	104	----

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW07-12	MW11-13S	MW11-13D	MW11-14	CP
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
						KS2202212-006	KS2202212-007	KS2202212-008	KS2202212-009	KS2202212-010
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		454	217	212	1560	146
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	5.4
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	2.7
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		454	217	212	1560	151
conductivity	----	E100	2.0	µS/cm		883	708	505	3320	332
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		567	363	243	985	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		594	385	253	1090	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		----	----	----	----	163
pH	----	E108	0.10	pH units		8.03	8.12	8.28	7.69	8.38
solids, total dissolved [TDS]	----	E162	10	mg/L		610	473	289	1900	182
turbidity	----	E121	0.10	NTU		16.7	11.2	3.61	357	<0.10
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0061	<0.0050	0.0226	131	<0.0050
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	0.979	<0.050	<1.00 DLDS	<0.050
chloride	16887-00-6	E235.Cl	0.50	mg/L		8.05	74.2	0.51	227	1.36
fluoride	16984-48-8	E235.F	0.020	mg/L		0.132	<0.100 DLDS	0.043	<0.400 DLDS	0.042
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.110	0.164	0.460	<0.100 DLDS	0.0535
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	0.0130	<0.0200 DLDS	0.0144
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		49.0	36.2	64.4	<6.00 DLDS	24.0
Organic / Inorganic Carbon										
carbon, total inorganic [TIC]	----	E354-L	0.50	mg/L		163	70.3	51.0	465	38.0
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		7.63	2.40	1.65	89.6 HTP	0.51
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		----	----	----	----	<0.0030
antimony, total	7440-36-0	E420	0.00010	mg/L		----	----	----	----	0.00028
arsenic, total	7440-38-2	E420	0.00010	mg/L		----	----	----	----	0.00086
barium, total	7440-39-3	E420	0.00010	mg/L		----	----	----	----	0.0892
beryllium, total	7440-41-7	E420	0.000100	mg/L		----	----	----	----	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L		----	----	----	----	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L		----	----	----	----	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L		----	----	----	----	0.0000104

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW07-12	MW11-13S	MW11-13D	MW11-14	CP
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
						KS2202212-006	KS2202212-007	KS2202212-008	KS2202212-009	KS2202212-010
						Result	Result	Result	Result	Result
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		132	105	62.3	243	45.9
cesium, total	7440-46-2	E420	0.000010	mg/L		----	----	----	----	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L		----	----	----	----	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L		----	----	----	----	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L		----	----	----	----	0.00192
iron, total	7439-89-6	E420	0.010	mg/L		1.06	0.237	0.115	47.4	<0.010
lead, total	7439-92-1	E420	0.000050	mg/L		----	----	----	----	0.000056
lithium, total	7439-93-2	E420	0.0010	mg/L		----	----	----	----	0.0011
magnesium, total	7439-95-4	E420	0.0050	mg/L		64.1	29.9	23.7	118	11.8
manganese, total	7439-96-5	E420	0.00010	mg/L		----	----	----	----	0.0390
mercury, total	7439-97-6	E508	0.0000050	mg/L		----	----	----	----	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L		----	----	----	----	0.00179
nickel, total	7440-02-0	E420	0.00050	mg/L		----	----	----	----	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L		----	----	----	----	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L		1.97	2.24	1.35	96.0	0.881
rubidium, total	7440-17-7	E420	0.00020	mg/L		----	----	----	----	0.00052
selenium, total	7782-49-2	E420	0.000050	mg/L		----	----	----	----	0.00119
silicon, total	7440-21-3	E420	0.10	mg/L		----	----	----	----	4.68
silver, total	7440-22-4	E420	0.000010	mg/L		----	----	----	----	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L		26.4	20.8	7.91	254	4.37
strontium, total	7440-24-6	E420	0.00020	mg/L		----	----	----	----	0.283
sulfur, total	7704-34-9	E420	0.50	mg/L		17.5	13.1	21.7	2.65	8.41
tellurium, total	13494-80-9	E420	0.00020	mg/L		----	----	----	----	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L		----	----	----	----	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L		----	----	----	----	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L		----	----	----	----	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L		----	----	----	----	<0.00030
tungsten, total	7440-33-7	E420	0.00010	mg/L		----	----	----	----	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L		----	----	----	----	0.000650
vanadium, total	7440-62-2	E420	0.00050	mg/L		----	----	----	----	0.00298
zinc, total	7440-66-6	E420	0.0030	mg/L		----	----	----	----	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L		----	----	----	----	<0.00020

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW07-12	MW11-13S	MW11-13D	MW11-14	CP
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
						KS2202212-006	KS2202212-007	KS2202212-008	KS2202212-009	KS2202212-010
						Result	Result	Result	Result	Result
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0010	0.0032	0.0028	0.0093	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00091	0.00019	<0.00010	0.00041	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00262	0.00100	0.00176	0.0300	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.134	0.115	0.0754	1.06	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000100 DLA	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	0.028	0.010	1.74	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000891	0.0000116	<0.0000050	<0.0000100 DLA	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		124	100	59.5	213	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	0.000249	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	0.00433	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00202	<0.00010	<0.00010	0.00602	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00072	0.00156	0.00031	<0.00040 DLA	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.457	<0.010	0.029	32.5	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000100 DLA	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0048	0.0019	0.0012	0.0144	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		62.5	27.6	22.9	110	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.330	0.00090	0.145	2.62	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00434	0.00330	0.00166	0.000752	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00443	<0.00050	<0.00050	0.0314	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		<0.050	0.056	<0.050	0.463	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		2.14	2.26	1.40	89.0	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00086	0.00058	0.00045	0.0166	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000688	0.00128	<0.000050	0.000225	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		10.4	6.88	7.72	22.1	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	0.000028	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		27.0	21.0	7.82	253	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.808	0.747	0.366	2.50	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		17.9	12.1	21.0	1.25	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00040 DLA	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		0.000025	<0.000010	<0.000010	<0.000020 DLA	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW07-12	MW11-13S	MW11-13D	MW11-14	CP
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
						KS2202212-006	KS2202212-007	KS2202212-008	KS2202212-009	KS2202212-010
						Result	Result	Result	Result	Result
Dissolved Metals										
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00020 DLA	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	0.00034	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	0.00434	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	0.00025	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00772	0.00556	0.000841	0.000191	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00165	0.00068	<0.00050	0.00955	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0017	0.0034	0.0013	<0.0020 DLA	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		0.00026	<0.00020	<0.00020	0.00877	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	----
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		19	<10	<10	333	<10
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.50	µg/L		----	----	----	3.05	----
ethylbenzene	100-41-4	E611A	0.50	µg/L		----	----	----	<0.50	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		----	----	----	1.71	----
styrene	100-42-5	E611A	0.50	µg/L		----	----	----	<0.50	----
toluene	108-88-3	E611A	0.50	µg/L		----	----	----	<0.50	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L		----	----	----	<0.40	----
xylene, o-	95-47-6	E611A	0.30	µg/L		----	----	----	<0.30	----
xylenes, total	1330-20-7	E611A	0.50	µg/L		----	----	----	<0.50	----
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		----	----	----	87.9	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		----	----	----	98.4	----
Hydrocarbons										
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		----	----	----	<100	----
VPHw	----	EC580A	100	µg/L		----	----	----	<100	----
Hydrocarbons Surrogates										
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		----	----	----	78.8	----

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SF	PM	DUPLICATE 1	----	----
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	----	----
						KS2202212-011	KS2202212-012	KS2202212-013	--------	--------
						Result	Result	Result	----	----
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		123	255	1340	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	20.6	<1.0	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	----	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L		<1.0	10.3	<1.0	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		123	275	1340	----	----
conductivity	----	E100	2.0	µS/cm		271	646	3250	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		----	----	1440	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		----	----	1510	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		138	324	----	----	----
pH	----	E108	0.10	pH units		8.29	8.50	7.54	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		164	383	2120	----	----
turbidity	----	E121	0.10	NTU		32.1	3.24	308	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	0.106	7.59	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.250 DLDS	1.56	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		1.56	28.5	394	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.040	<0.100 DLDS	<0.400 DLDS	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.149	0.196	<0.100 DLDS	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	0.0551	<0.0200 DLDS	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		17.9	44.2	<6.00 DLDS	----	----
Organic / Inorganic Carbon										
carbon, total inorganic [TIC]	----	E354-L	0.50	mg/L		29.7	63.9	440	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		0.61	6.86	73.9	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0270	0.0396	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00030	0.00016	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00211	0.00057	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0903	0.0878	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	0.035	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000243	0.0000348	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SF	PM	DUPLICATE 1	----	----
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	----	----
						KS2202212-011	KS2202212-012	KS2202212-013	--------	--------
						Result	Result	Result	----	----
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		37.8	97.7	315	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		0.00877	<0.00050	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00102	0.00040	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.0195	0.00249	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		24.8	0.065	12.8	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.0259	0.000111	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	0.0020	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		10.6	19.4	175	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.343	0.560	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	0.0000068	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000857	0.00323	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00828	0.00252	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.703	2.14	16.9	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00029	0.00067	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000390	0.000238	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		4.80	7.51	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		0.000018	0.000019	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		3.54	15.4	316	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.244	0.496	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		4.21	16.5	3.05	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	0.000012	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		0.00022	0.00219	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00031	0.00134	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	0.00044	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000605	0.00156	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00615	0.00077	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0101	3.21	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SF	PM	DUPLICATE 1	----	----
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	----	----
						KS2202212-011	KS2202212-012	KS2202212-013	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		----	----	0.0083	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		----	----	0.00029	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		----	----	0.00347	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		----	----	1.41	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		----	----	<0.000100	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		----	----	<0.000100 DLA	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		----	----	1.24	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		----	----	0.000152	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		----	----	305	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		----	----	<0.000020 DLA	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		----	----	0.00179	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		----	----	0.0140	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		----	----	0.00436	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		----	----	3.92	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		----	----	0.000104	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		----	----	0.0080	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		----	----	165	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		----	----	8.30	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		----	----	0.0000186	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		----	----	0.00408	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		----	----	0.128	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		----	----	0.104	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		----	----	16.3	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		----	----	0.00372	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		----	----	0.000329	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		----	----	19.2	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		----	----	0.000029	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		----	----	319	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		----	----	3.42	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		----	----	2.05	----	----
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	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	SF	PM	DUPLICATE 1	----	----
					Client sampling date / time	17-Jun-2022	17-Jun-2022	17-Jun-2022	----	----
Analyte	CAS Number	Method	LOR	Unit		KS2202212-011	KS2202212-012	KS2202212-013	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		----	----	<0.00020 DLA	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		----	----	0.00052	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		----	----	<0.00180 DLM	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		----	----	0.00033	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		----	----	0.00842	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		----	----	0.00293	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		----	----	<0.0020 DLA	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		----	----	0.00707	----	----
dissolved mercury filtration location	----	EP509	-	-		----	----	Field	----	----
dissolved metals filtration location	----	EP421	-	-		----	----	Field	----	----
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		<10	15	260	----	----
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.50	µg/L		----	----	2.90	----	----
ethylbenzene	100-41-4	E611A	0.50	µg/L		----	----	<0.50	----	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		----	----	1.64	----	----
styrene	100-42-5	E611A	0.50	µg/L		----	----	<0.50	----	----
toluene	108-88-3	E611A	0.50	µg/L		----	----	<0.50	----	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L		----	----	<0.40	----	----
xylene, o-	95-47-6	E611A	0.30	µg/L		----	----	<0.30	----	----
xylenes, total	1330-20-7	E611A	0.50	µg/L		----	----	<0.50	----	----
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		----	----	88.7	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		----	----	100.0	----	----
Hydrocarbons										
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		----	----	<100	----	----
VPHw	----	EC580A	100	µg/L		----	----	<100	----	----
Hydrocarbons Surrogates										
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		----	----	83.2	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **KS2202212**	Page	: 1 of 37
Client	: **Wood Environment & Infrastructure Solutions Canada Limited**	Laboratory	: Kamloops - Environmental
Contact	: Maylee Eisbrenner	Account Manager	: Selam Worku
Address	: 3456 Opie Crescent Prince George BC Canada V2N 2P9	Address	: 1445 McGill Road, Unit 2B Kamloops, British Columbia Canada V2C 6K7
Telephone	: 250 564 3243	Telephone	: +1 250 372 3588
Project	: KX05593.2.****	Date Samples Received	: 20-Jun-2022 15:40
PO	: GL Code: 5730 Org:1110	Issue Date	: 06-Jul-2022 23:15
C-O-C number	: 20-993494		
Sampler	: ----		
Site	: ----		
Quote number	: BC Standard Pricing		
No. of samples received	: 13		
No. of samples analysed	: 13		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) CP	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) DUPLICATE 1	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW05-08S	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW07-12	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW08-8D	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW11-13D	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW11-13S	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
MW11-14	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
OW1	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
OW6	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
OW-7	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
PM	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
SF	E559-L	17-Jun-2022	----	----	----		05-Jul-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
CP	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
DUPLICATE 1	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW05-08S	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW07-12	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW08-8D	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW11-13D	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW11-13S	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW11-14	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
OW1	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
OW6	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
OW-7	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
PM	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SF	E298	17-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
CP	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
DUPLICATE 1	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
MW05-08S	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
MW07-12	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
MW08-8D	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
MW11-13D	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
MW11-13S	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
MW11-14	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE OW1	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE OW6	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE OW-7	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE PM	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SF	E235.Br-L	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE CP	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE DUPLICATE 1	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW05-08S	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW07-12	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE MW08-8D	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW11-13D	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW11-13S	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW11-14	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE OW1	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE OW6	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE OW-7	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE PM	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SF	E235.Cl	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE CP	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE DUPLICATE 1	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW05-08S	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW07-12	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW08-8D	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW11-13D	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW11-13S	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW11-14	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE OW1	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE OW6	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE OW-7	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE PM	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SF	E235.F	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE CP	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	✖ EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE DUPLICATE 1	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	✖ EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW05-08S	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	✖ EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW07-12	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	✖ EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW08-8D	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	✖ EHTL

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW11-13D	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW11-13S	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW11-14	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE OW1	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE OW6	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE OW-7	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE PM	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SF	E235.NO3-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE CP	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE DUPLICATE 1	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW05-08S	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW07-12	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW08-8D	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW11-13D	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW11-13S	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW11-14	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE OW1	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE OW6	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE OW-7	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE PM	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SF	E235.NO2-L	17-Jun-2022	----	----	----		23-Jun-2022	3 days	6 days	× EHTL
Anions and Nutrients : Sulfate in Water by IC										
HDPE CP	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE DUPLICATE 1	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW05-08S	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW07-12	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW08-8D	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW11-13D	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW11-13S	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW11-14	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
OW1	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
OW6	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
OW-7	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
PM	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SF	E235.SO4	17-Jun-2022	----	----	----		23-Jun-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
DUPLICATE 1	E509	17-Jun-2022	06-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW05-08S	E509	17-Jun-2022	06-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW07-12	E509	17-Jun-2022	06-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW08-8D	E509	17-Jun-2022	06-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW11-13D	E509	17-Jun-2022	06-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW11-13S	E509	17-Jun-2022	06-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW11-14	E509	17-Jun-2022	06-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) OW1	E509	17-Jun-2022	06-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) OW6	E509	17-Jun-2022	06-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) OW-7	E509	17-Jun-2022	06-Jul-2022	----	----		06-Jul-2022	28 days	19 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) DUPLICATE 1	E421	17-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	16 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW05-08S	E421	17-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	16 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW07-12	E421	17-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	16 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW08-8D	E421	17-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	16 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW11-13D	E421	17-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	16 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW11-13S	E421	17-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	16 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW11-14	E421	17-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	16 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) OW1	E421	17-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	16 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) OW6	E421	17-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	16 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) OW-7	E421	17-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	16 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW05-08S	E601A	17-Jun-2022	29-Jun-2022	14 days	12 days	✓	04-Jul-2022	40 days	5 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) OW1	E601A	17-Jun-2022	29-Jun-2022	14 days	12 days	✓	04-Jul-2022	40 days	5 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) OW6	E601A	17-Jun-2022	29-Jun-2022	14 days	12 days	✓	04-Jul-2022	40 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUPLICATE 1	E581.VH+F1	17-Jun-2022	30-Jun-2022	----	----		01-Jul-2022	14 days	15 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW11-14	E581.VH+F1	17-Jun-2022	30-Jun-2022	----	----		01-Jul-2022	14 days	15 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE CP	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE DUPLICATE 1	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE MW05-08S	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE MW07-12	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE MW08-8D	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE MW11-13D	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE MW11-13S	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE MW11-14	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE OW1	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE OW6	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE OW-7	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE PM	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE SF	E354-L	17-Jun-2022	----	----	----		26-Jun-2022	14 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) CP	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) DUPLICATE 1	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW05-08S	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW07-12	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW08-8D	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW11-13D	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW11-13S	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW11-14	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) OW1	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) OW6	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) OW-7	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) PM	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SF	E355-L	17-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	18 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE CP	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	× EHT
Physical Tests : Alkalinity Species by Titration										
HDPE DUPLICATE 1	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	× EHT
Physical Tests : Alkalinity Species by Titration										
HDPE MW05-08S	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	× EHT
Physical Tests : Alkalinity Species by Titration										
HDPE MW07-12	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	× EHT
Physical Tests : Alkalinity Species by Titration										
HDPE MW08-8D	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE MW11-13D	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	✖ EHT
Physical Tests : Alkalinity Species by Titration										
HDPE MW11-13S	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	✖ EHT
Physical Tests : Alkalinity Species by Titration										
HDPE MW11-14	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	✖ EHT
Physical Tests : Alkalinity Species by Titration										
HDPE OW1	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	✖ EHT
Physical Tests : Alkalinity Species by Titration										
HDPE OW6	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	✖ EHT
Physical Tests : Alkalinity Species by Titration										
HDPE OW-7	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	✖ EHT
Physical Tests : Alkalinity Species by Titration										
HDPE PM	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	✖ EHT
Physical Tests : Alkalinity Species by Titration										
HDPE SF	E290	17-Jun-2022	----	----	----		03-Jul-2022	14 days	16 days	✖ EHT
Physical Tests : Conductivity in Water										
HDPE CP	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE DUPLICATE 1	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓
Physical Tests : Conductivity in Water										
HDPE MW05-08S	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓
Physical Tests : Conductivity in Water										
HDPE MW07-12	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓
Physical Tests : Conductivity in Water										
HDPE MW08-8D	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓
Physical Tests : Conductivity in Water										
HDPE MW11-13D	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓
Physical Tests : Conductivity in Water										
HDPE MW11-13S	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓
Physical Tests : Conductivity in Water										
HDPE MW11-14	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓
Physical Tests : Conductivity in Water										
HDPE OW1	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓
Physical Tests : Conductivity in Water										
HDPE OW6	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE OW-7	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓
Physical Tests : Conductivity in Water										
HDPE PM	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓
Physical Tests : Conductivity in Water										
HDPE SF	E100	17-Jun-2022	----	----	----		03-Jul-2022	28 days	16 days	✓
Physical Tests : pH by Meter										
HDPE CP	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE DUPLICATE 1	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW05-08S	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW07-12	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW08-8D	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW11-13D	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE MW11-13S	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE MW11-14	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE OW1	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE OW6	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE OW-7	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE PM	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE SF	E108	17-Jun-2022	----	----	----		03-Jul-2022	0.25 hrs	393 hrs	✖ EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE CP	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE DUPLICATE 1	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE MW05-08S	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MW07-12	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MW08-8D	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MW11-13D	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MW11-13S	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MW11-14	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE OW1	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE OW6	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE OW-7	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE PM	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SF	E162	17-Jun-2022	----	----	----		24-Jun-2022	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE CP	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE DUPLICATE 1	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE MW05-08S	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE MW07-12	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE MW08-8D	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE MW11-13D	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE MW11-13S	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE MW11-14	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE OW1	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE OW6	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE OW-7	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE PM	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE SF	E121	17-Jun-2022	----	----	----		22-Jun-2022	3 days	6 days	× EHTL
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW05-08S	E641A	17-Jun-2022	29-Jun-2022	14 days	12 days	✓	04-Jul-2022	40 days	5 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) OW1	E641A	17-Jun-2022	29-Jun-2022	14 days	12 days	✓	04-Jul-2022	40 days	5 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) OW6	E641A	17-Jun-2022	29-Jun-2022	14 days	12 days	✓	04-Jul-2022	40 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) CP	E508	17-Jun-2022	----	----	----		06-Jul-2022	28 days	19 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) PM	E508	17-Jun-2022	----	----	----		06-Jul-2022	28 days	19 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SF	E508	17-Jun-2022	----	----	----		06-Jul-2022	28 days	19 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) CP	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) DUPLICATE 1	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MW05-08S	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MW07-12	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MW08-8D	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MW11-13D	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MW11-13S	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) MW11-14	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) OW1	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) OW6	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) OW-7	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) PM	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SF	E420	17-Jun-2022	----	----	----		03-Jul-2022	180 days	17 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUPLICATE 1	E611A	17-Jun-2022	30-Jun-2022	----	----		01-Jul-2022	14 days	15 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW11-14	E611A	17-Jun-2022	30-Jun-2022	----	----		01-Jul-2022	14 days	15 days	✓

Legend & Qualifier Definitions

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

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	534928	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	549315	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	534932	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	544670	1	2	50.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	549246	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	534931	1	20	5.0	5.0	✓
Conductivity in Water	E100	534929	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	551183	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	545635	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	534930	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	534933	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	534934	1	20	5.0	5.0	✓
pH by Meter	E108	534927	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	534935	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	536704	1	19	5.2	5.0	✓
Total Inorganic Carbon by Combustion (Low Level)	E354-L	538940	2	33	6.0	5.0	✓
Total Mercury in Water by CVAAS	E508	551132	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	543708	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	549319	1	16	6.2	5.0	✓
Turbidity by Nephelometry	E121	534345	1	13	7.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	544669	1	2	50.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	534928	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	549315	1	19	5.2	5.0	✓
BC PHCs - EPH by GC-FID	E601A	542812	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	534932	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	544670	1	2	50.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	549246	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	534931	1	20	5.0	5.0	✓
Conductivity in Water	E100	534929	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	551183	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	545635	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	534930	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	534933	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	534934	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	542813	1	14	7.1	5.0	✓
pH by Meter	E108	534927	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Sulfate in Water by IC	E235.SO4	534935	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	536704	1	19	5.2	5.0	✓
Total Inorganic Carbon by Combustion (Low Level)	E354-L	538940	2	33	6.0	5.0	✓
Total Mercury in Water by CVAAS	E508	551132	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	543708	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	549319	1	16	6.2	5.0	✓
Turbidity by Nephelometry	E121	534345	1	13	7.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	544669	1	2	50.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	534928	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	549315	1	19	5.2	5.0	✓
BC PHCs - EPH by GC-FID	E601A	542812	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	534932	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	544670	1	2	50.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	549246	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	534931	1	20	5.0	5.0	✓
Conductivity in Water	E100	534929	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	551183	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	545635	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	534930	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	534933	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	534934	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	542813	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	534935	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	536704	1	19	5.2	5.0	✓
Total Inorganic Carbon by Combustion (Low Level)	E354-L	538940	2	33	6.0	5.0	✓
Total Mercury in Water by CVAAS	E508	551132	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	543708	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	549319	1	16	6.2	5.0	✓
Turbidity by Nephelometry	E121	534345	1	13	7.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	544669	1	2	50.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	549315	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	534932	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	544670	1	2	50.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	549246	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	534931	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	551183	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	545635	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	534930	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Nitrate in Water by IC (Low Level)	E235.NO3-L	534933	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	534934	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	534935	1	20	5.0	5.0	✓
Total Inorganic Carbon by Combustion (Low Level)	E354-L	538940	2	33	6.0	5.0	✓
Total Mercury in Water by CVAAS	E508	551132	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	543708	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	549319	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	544669	1	2	50.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Inorganic Carbon by Combustion (Low Level)	E354-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Total Inorganic Carbon is determined by the high temperature combustion method with measurement by an infrared detector, where the sample is acidified in a reaction chamber to convert all inorganic carbons (carbonates) to carbon dioxide for analysis.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 Vancouver - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO_3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **KS2202212**	Page	: 1 of 20
Client	: Wood Environment & Infrastructure Solutions Canada Limited	Laboratory	: Kamloops - Environmental
Contact	: Maylee Eisbrenner	Account Manager	: Selam Worku
Address	: 3456 Opie Crescent Prince George BC Canada V2N 2P9	Address	: 1445 McGill Road, Unit 2B Kamloops, British Columbia Canada V2C 6K7
Telephone	: 250 564 3243	Telephone	: +1 250 372 3588
Project	: KX05593.2.****	Date Samples Received	: 20-Jun-2022 15:40
PO	: GL Code: 5730 Org:1110	Date Analysis Commenced	: 22-Jun-2022
C-O-C number	: 20-993494	Issue Date	: 06-Jul-2022 23:15
Sampler	: ----		
Site	: ----		
Quote number	: BC Standard Pricing		
No. of samples received	: 13		
No. of samples analysed	: 13		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Ann Joby	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Vancouver Organics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
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Parnian Sane	Analyst	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 534345)											
KS2202212-001	OW1	turbidity	----	E121	0.10	NTU	264	264	0.152%	15%	----
Physical Tests (QC Lot: 534927)											
KS2202212-003	OW-7	pH	----	E108	0.10	pH units	7.44	7.47	0.402%	4%	----
Physical Tests (QC Lot: 534928)											
KS2202212-003	OW-7	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	849	837	1.38%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	849	837	1.38%	20%	----
Physical Tests (QC Lot: 534929)											
KS2202212-003	OW-7	conductivity	----	E100	2.0	µS/cm	2140	2170	1.39%	10%	----
Physical Tests (QC Lot: 536704)											
KS2202193-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	491	493	0.406%	20%	----
Anions and Nutrients (QC Lot: 534930)											
KS2202212-001	OW1	fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 534931)											
KS2202212-001	OW1	chloride	16887-00-6	E235.Cl	10.0	mg/L	401	395	1.53%	20%	----
Anions and Nutrients (QC Lot: 534932)											
KS2202212-001	OW1	bromide	24959-67-9	E235.Br-L	1.00	mg/L	1.55	1.65	0.107	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 534933)											
KS2202212-001	OW1	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 534934)											
KS2202212-001	OW1	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	<0.0200	<0.0200	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 534935)											
KS2202212-001	OW1	sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	<6.00	<6.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 549315)											
KS2202212-001	OW1	ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	7.65	7.64	0.149%	20%	----
Organic / Inorganic Carbon (QC Lot: 538940)											
KS2202212-001	OW1	carbon, total inorganic [TIC]	----	E354-L	5.00	mg/L	451	446	1.08%	20%	----
Organic / Inorganic Carbon (QC Lot: 539864)											
KS2202212-001	OW1	carbon, total inorganic [TIC]	----	E354-L	5.00	mg/L	451	440	2.53%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 549319)											
KS2202212-001	OW1	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	70.4	74.0	4.89%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00015	0.00014	0.00001	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00130	0.00123	5.36%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.253	0.250	1.22%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.062	0.065	0.003	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000379	0.0000367	0.0000012	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	140	144	2.80%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000073	0.000056	0.000017	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00066	<0.00050	0.00016	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00145	0.00150	3.29%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00090	0.00085	0.00006	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	1.50	1.43	4.79%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000338	0.000314	0.000024	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.101	0.105	3.92%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	40.1	40.2	0.492%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.304	0.300	1.22%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00111	0.00107	4.04%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00388	0.00370	0.00018	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	0.067	<0.050	0.017	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.96	1.92	2.46%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000323	0.000303	0.000020	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	5.92	5.58	5.87%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	133	131	1.02%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.234	0.237	1.43%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	56.5	57.7	2.05%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000013	0.000010	0.000002	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00467	0.00447	4.47%	20%	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0048	0.0039	0.0008	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 543708) - continued											
FJ2201668-001	Anonymous	zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00024	<0.00020	0.00004	Diff <2x LOR	----
Total Metals (QC Lot: 551132)											
FJ2201706-008	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 545635)											
CG2208318-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00028	0.00028	0.000004	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0160	0.0170	5.90%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.013	0.012	0.001	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.849 µg/L	0.000871	2.57%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	193	179	7.29%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000019	0.000018	0.0000008	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00034	0.00034	0.000001	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0249	0.0226	9.94%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	132	135	1.85%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00121	0.00120	0.551%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00821	0.00859	4.45%	20%	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.64	2.66	0.625%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00206	0.00205	0.641%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	186 µg/L	0.202	8.13%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.96	2.02	2.80%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	3.43	3.50	2.14%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.166	0.162	2.36%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	245	245	0.00666%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000048	0.000045	0.000003	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 545635) - continued											
CG2208318-001	Anonymous	thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00749	0.00726	3.12%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0089	0.0088	0.0001	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 551183)											
KS2202212-001	OW1	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	0.0000199	0.0000182	0.0000017	Diff <2x LOR	----
Aggregate Organics (QC Lot: 549246)											
KS2202212-001	OW1	chemical oxygen demand [COD]	----	E559-L	10	mg/L	269	275	2.40%	20%	----
Volatile Organic Compounds (QC Lot: 544670)											
KS2202212-009	MW11-14	benzene	71-43-2	E611A	0.50	µg/L	3.05	3.86	23.4%	30%	----
		ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	1.71	2.17	0.46	Diff <2x LOR	----
		styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 544669)											
KS2202212-009	MW11-14	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 534345)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 534928)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 534929)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 536704)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 534930)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 534931)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 534932)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 534933)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 534934)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 534935)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 549315)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 538940)						
carbon, total inorganic [TIC]	----	E354-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 539864)						
carbon, total inorganic [TIC]	----	E354-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 549319)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 543708)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 543708) - continued						
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 543708) - continued						
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 551132)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 545635)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 545635) - continued						
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 551183)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 549246)						
chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Volatile Organic Compounds (QCLot: 544670)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 542812)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 544669)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 542813)						
acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 542813) - continued						
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 534345)									
turbidity	----	E121	0.1	NTU	200 NTU	99.3	85.0	115	----
Physical Tests (QCLot: 534927)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 534928)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	88.9	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.2	85.0	115	----
Physical Tests (QCLot: 534929)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	102	90.0	110	----
Physical Tests (QCLot: 536704)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	93.4	85.0	115	----
Anions and Nutrients (QCLot: 534930)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	106	90.0	110	----
Anions and Nutrients (QCLot: 534931)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 534932)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	98.9	85.0	115	----
Anions and Nutrients (QCLot: 534933)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 534934)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 534935)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 549315)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	102	85.0	115	----
Organic / Inorganic Carbon (QCLot: 538940)									
carbon, total inorganic [TIC]	----	E354-L	0.5	mg/L	8 mg/L	97.2	80.0	120	----
Organic / Inorganic Carbon (QCLot: 539864)									
carbon, total inorganic [TIC]	----	E354-L	0.5	mg/L	8 mg/L	93.8	80.0	120	----
Organic / Inorganic Carbon (QCLot: 549319)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	101	80.0	120	----
Total Metals (QCLot: 543708)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 543708) - continued									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	106	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	113	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	92.3	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	104	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	103	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.4	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	99.8	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	103	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	103	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	106	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	106	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	108	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.0	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	107	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	103	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	105	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	105	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	97.8	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	104	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	97.5	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	103	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 543708) - continued									
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
Total Metals (QCLot: 551132)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	95.4	80.0	120	----
Dissolved Metals (QCLot: 545635)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	105	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	110	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	106	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	103	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	98.5	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	106	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	109	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	107	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	104	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	104	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	108	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	107	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	107	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	103	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	110	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	109	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	102	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	102	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	99.2	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 545635) - continued									
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	101	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	97.5	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	107	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	93.8	80.0	120	----
Aggregate Organics (QCLot: 549246)									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	111	85.0	115	----
Volatile Organic Compounds (QCLot: 544670)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	112	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	107	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	115	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	111	70.0	130	----
Hydrocarbons (QCLot: 542812)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	109	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	113	70.0	130	----
Hydrocarbons (QCLot: 544669)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	75.4	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 542813)									
acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	91.0	60.0	130	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	93.7	60.0	130	----
acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	95.5	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	98.3	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	98.2	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	94.0	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	98.2	60.0	130	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 542813) - continued									
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	98.8	60.0	130	----
fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	95.2	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	88.8	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	84.6	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	80.6	60.0	130	----
naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	86.9	50.0	130	----
phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	97.8	60.0	130	----
pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	114	60.0	130	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 534930)										
KS2202212-002	OW6	fluoride	16984-48-8	E235.F	21.8 mg/L	20 mg/L	109	75.0	125	----
Anions and Nutrients (QCLot: 534931)										
KS2202212-002	OW6	chloride	16887-00-6	E235.Cl	2080 mg/L	2000 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 534932)										
KS2202212-002	OW6	bromide	24959-67-9	E235.Br-L	10.0 mg/L	10 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 534933)										
KS2202212-002	OW6	nitrate (as N)	14797-55-8	E235.NO3-L	52.5 mg/L	50 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 534934)										
KS2202212-002	OW6	nitrite (as N)	14797-65-0	E235.NO2-L	10.3 mg/L	10 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 534935)										
KS2202212-002	OW6	sulfate (as SO4)	14808-79-8	E235.SO4	2070 mg/L	2000 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 549315)										
KS2202212-002	OW6	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Organic / Inorganic Carbon (QCLot: 538940)										
KS2202212-002	OW6	carbon, total inorganic [TIC]	----	E354-L	ND mg/L	50 mg/L	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 539864)										
KS2202212-002	OW6	carbon, total inorganic [TIC]	----	E354-L	ND mg/L	50 mg/L	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 549319)										
KS2202212-002	OW6	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 543708)										
FJ2201669-001	Anonymous	aluminum, total	7429-90-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		antimony, total	7440-36-0	E420	0.0213 mg/L	0.02 mg/L	106	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00866 mg/L	0.01 mg/L	86.6	70.0	130	----
		boron, total	7440-42-8	E420	0.088 mg/L	0.1 mg/L	88.0	70.0	130	----
		cadmium, total	7440-43-9	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 543708) - continued										
FJ2201669-001	Anonymous	cesium, total	7440-46-2	E420	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		chromium, total	7440-47-3	E420	0.0393 mg/L	0.04 mg/L	98.3	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		copper, total	7440-50-8	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		iron, total	7439-89-6	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		lead, total	7439-92-1	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0218 mg/L	0.02 mg/L	109	70.0	130	----
		nickel, total	7440-02-0	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.1 mg/L	10 mg/L	101	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		selenium, total	7782-49-2	E420	0.0368 mg/L	0.04 mg/L	92.1	70.0	130	----
		silicon, total	7440-21-3	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, total	7440-22-4	E420	0.00396 mg/L	0.004 mg/L	99.1	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0398 mg/L	0.04 mg/L	99.6	70.0	130	----
		thallium, total	7440-28-0	E420	0.00364 mg/L	0.004 mg/L	91.1	70.0	130	----
		thorium, total	7440-29-1	E420	0.0214 mg/L	0.02 mg/L	107	70.0	130	----
		tin, total	7440-31-5	E420	0.0200 mg/L	0.02 mg/L	100.0	70.0	130	----
		titanium, total	7440-32-6	E420	0.0398 mg/L	0.04 mg/L	99.6	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0191 mg/L	0.02 mg/L	95.6	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0982 mg/L	0.1 mg/L	98.2	70.0	130	----
		zinc, total	7440-66-6	E420	0.390 mg/L	0.4 mg/L	97.4	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0434 mg/L	0.04 mg/L	108	70.0	130	----
Total Metals (QCLot: 551132)										
KS2202212-010	CP	mercury, total	7439-97-6	E508	0.0000914 mg/L	0.0001 mg/L	91.4	70.0	130	----
Dissolved Metals (QCLot: 545635)										
FJ2201668-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.210 mg/L	0.2 mg/L	105	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0201 mg/L	0.02 mg/L	101	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 545635) - continued										
FJ2201668-001	Anonymous	barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0398 mg/L	0.04 mg/L	99.5	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00828 mg/L	0.01 mg/L	82.8	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.092 mg/L	0.1 mg/L	91.5	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00373 mg/L	0.004 mg/L	93.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.00938 mg/L	0.01 mg/L	93.8	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0384 mg/L	0.04 mg/L	96.1	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0177 mg/L	0.02 mg/L	88.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.90 mg/L	2 mg/L	94.9	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0178 mg/L	0.02 mg/L	88.9	70.0	130	----
		lithium, dissolved	7439-93-2	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0361 mg/L	0.04 mg/L	90.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.9 mg/L	10 mg/L	109	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.93 mg/L	4 mg/L	98.2	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0200 mg/L	0.02 mg/L	99.8	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0419 mg/L	0.04 mg/L	105	70.0	130	----
		silicon, dissolved	7440-21-3	E421	10.2 mg/L	10 mg/L	102	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00343 mg/L	0.004 mg/L	85.7	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0195 mg/L	0.02 mg/L	97.6	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0393 mg/L	0.04 mg/L	98.3	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.372 mg/L	0.4 mg/L	93.1	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0422 mg/L	0.04 mg/L	105	70.0	130	----
Dissolved Metals (QCLot: 551183)										

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 551183) - continued										
KS2202212-002	OW6	mercury, dissolved	7439-97-6	E509	0.0000854 mg/L	0.0001 mg/L	85.4	70.0	130	----
Aggregate Organics (QCLot: 549246)										
KS2202212-002	OW6	chemical oxygen demand [COD]	----	E559-L	ND mg/L	100 mg/L	ND	75.0	125	----
Volatile Organic Compounds (QCLot: 544670)										
KS2202212-009	MW11-14	benzene	71-43-2	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		ethylbenzene	100-41-4	E611A	105 µg/L	100 µg/L	105	60.0	140	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		styrene	100-42-5	E611A	98.1 µg/L	100 µg/L	98.1	60.0	140	----
		toluene	108-88-3	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	219 µg/L	200 µg/L	110	60.0	140	----
		xylene, o-	95-47-6	E611A	107 µg/L	100 µg/L	107	60.0	140	----
Hydrocarbons (QCLot: 544669)										
KS2202212-013	DUPLICATE 1	VHw (C6-C10)	----	E581.VH+F1	3810 µg/L	6310 µg/L	60.4	60.0	140	----

Qualifiers

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

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 993494

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Environmental Division Kamloops
Work Order Reference
KS2202212

Telephone : +1 250 372 3588

Report To	Contact and company name below will appear on the final report
Company:	WOOD E&I S
Contact:	MAYLEE EISBRENNER
Phone:	250-960-9845
	Company address below will appear on the final report
Street:	3456 OPLE CRES
City/Province:	PRINCE GEORGE / BC
Postal Code:	~~V0K 2A0~~ V2N 2P9
Invoice To	Same as Report To ☒ YES ☐ NO
	Copy of Invoice with Report ☒ YES ☐ NO
Company:	
Contact:	

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

Invoice Recipients

Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax
Email 2

Turnaround Time (TAT) Requested

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

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please cont

Project Information

ALS Account # / Quote #:
Job #: KX05593.2.~~*****~~.
PO / AFE: GL Code: 5730 Org: 1110
LSD:

Oil and Gas Required Fields (client use)

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

ALS Lab Work Order # (ALS use only): KS2202212
ALS Contact: SELAM Sampler:

Analysis Requ

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	GEN CHEM	TOTAL SULPHUR	AMMONIA	LEAH/HEPH/MPH	BTEX/VPH	TOC	TIC	COD	DISSOLVED METALS	TOTAL METALS	SAMPLES ON HOLD	EXTENDED STORAGE REQUIF	SUSPECTED HAZARD (see no
1	OW4	17-JUN-22		WATER	7	X	X	X	X		X	X	X	X				
2	OW6				7	X	X	X	X		X	X	X	X				
3	OW-7				5	X	X	X			X	X	X	X				
4	MW05-BS				7	X	X	X	X		X	X	X	X				
5	MW08-BD				5	X	X	X			X	X	X	X				
6	MW07-12				5	X	X	X			X	X	X	X				
7	MW11-BS				5	X	X	X			X	X	X	X				
8	MW11-BD				5	X	X	X			X	X	X	X				
9	MW11-14				7	X	X	X		X	X	X	X	X				
10	CP				4	X	X	X			X	X	X		X			
11	SIF				4	X	X	X			X	X	X		X			
12	PM				4	X	X	X			X	X	X		X			
13	DUPLICATE 1				7	X	X	X		X	X	X	X	X				

Drinking Water (DW) Samples' (client use)
Are samples taken from a Regulated DW System? ☐ YES ☒ NO
Are samples for human consumption/ use? ☐ YES ☒ NO

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

GEN CHEM: Conductivity, hardness, pH, TDS, turbidity, alkalinity (bicarbonate, carbonate, hydroxide, total), bromide, chloride, fluoride, nitrate, nitrite, sulphate, total calcium, total iron, total magnesium, total potassium, total sodium

SAMPLE RECEIPT DETAILS (ALS use only)

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
12/6	10/12	12/12	12/9				

SHIPMENT RELEASE (client use)

Released by: Date: 17 JUNE 2022 Time: 17:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: JUN 20 2022 Time: 540

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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

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

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 993494

Canada Toll Free: 1 800 668 9878

Page 1 of 1

www.alsglobal.com

Environmental Division Kamloops
Work Order Reference
KS2202212

Telephone : +1 250 372 3566

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	WOOD E&IS	Select Report Format: ☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)	☒ Routine [R] If received by 3pm M-F - no surcharges apply
Contact:	MAYLEE EISBRENNER	Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:	250-960-9845	☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	3456 OPLE CRES	Email 1 or Fax	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	PRINCE GEORGE / BC	Email 2	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional charges may apply to rush requests on weekends, statutory holidays and non-routine
Postal Code:	~~V2K 2A7~~ V2N 2P9	Email 3	Date and Time Required for all E&P TATs:
Invoice To	Same as Report To ☒ YES ☐ NO	Invoice Recipients	For all tests with rush TATs requested, please cont
	Copy of Invoice with Report ☒ YES ☐ NO	Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	Analysis Requ
Company:		Email 1 or Fax	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	KX05593.2.~~0000~~	Major/Minor Code:	Routing Code:
PO / AFE:	GL Code: 5730 Org: 1110	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	KS2202212	ALS Contact: SELAM	Sampler:

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	GEN CHEM	TOTAL SULPHUR	AMMONIA	LEAD / HEPH/MPH	BTEX / VPH	TOC	TN	COD	DISSOLVED METALS	TOTAL METALS	SAMPLES ON HOLD	EXTENDED STORAGE REQUIR	SUSPECTED HAZARD (see no
1	OW1	17-JUN-22		WATER	4	X	X	X	X		X	X	X	X				
2	OW6				4	X	X	X	X		X	X	X	X				
3	OW7				5	X	X	X			X	X	X	X				
4	MW05-BS				7	X	X	X	X		X	X	X	X				
5	MW08-BD				5	X	X	X			X	X	X	X				
6	MW07-12				5	X	X	X			X	X	X	X				
7	MW11-BS				5	X	X	X			X	X	X	X				
8	MW11-BD				5	X	X	X			X	X	X	X				
9	MW11-14				7	X	X	X		X	X	X	X	X				
10	CP				4	X	X	X			X	X	X		X			
11	SF				4	X	X	X			X	X	X		X			
12	PM				4	X	X	X			X	X	X		X			
13	DUPLICATE 1				7	X	X	X		X	X	X	X	X	X			

Drinking Water (DW) Samples (client use)

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

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

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

GEN CHEM: Conductivity, hardness, pH, TDS, turbidity, alkalinity (bicarbonate, carbonate, hydroxide, total), bromide, chloride, fluoride, nitrate, nitrite, sulphate, total calcium, total iron, total magnesium, total potassium, total sodium

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C		
12/6	10/12	12/12	12/9	6.5 °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date: 17 JUNE 2022	Time: 17:30	Received by:	Date: JUN 20 2022	Time: 8:40	Received by: JA	Date: JUN 22 2022	Time: 9:15am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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

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

ALS Canada Ltd.

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CERTIFICATE OF ANALYSIS

Work Order	: **VA22C6911**	Page	: 1 of 16
Client	: **WSP E&I Canada Limited**	Laboratory	: Vancouver - Environmental
Contact	: Maylee Eisbrenner	Account Manager	: Selam Worku
Address	: 3456 Opie Crescent Prince George BC Canada V2N 2P9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 564 3243	Telephone	: +1 604 253 4188
Project	: KX05593.3	Date Samples Received	: 04-Nov-2022 09:00
PO	: KX05593.3.***.1110.573000	Date Analysis Commenced	: 05-Nov-2022
C-O-C number	: 17-717380	Issue Date	: 16-Nov-2022 16:05
Sampler	: ME		
Site	: ----		
Quote number	: VA21-WOOD100-015		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Jeanie Mark	Laboratory Analyst	Organics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia
Sorina Motea	Laboratory Analyst	Organics, Calgary, Alberta

General Comments

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

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

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

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

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no unit
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
HTD	*Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	OW1	OW6	MW05-8S	MW08-8D	MW11-13D
					Client sampling date / time	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022
						VA22C6911-001	VA22C6911-002	VA22C6911-003	VA22C6911-004	VA22C6911-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		1510	1220	1190	693	206
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	6.2
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	3.1
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		1510	1220	1190	693	212
conductivity	----	E100	2.0	µS/cm		3550	2850	2660	1850	554
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		1490	879	942	919	276
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		1660	969	982	962	300
pH	----	E108	0.10	pH units		7.05	6.97	7.05	7.38	8.33
solids, total dissolved [TDS]	----	E162	10	mg/L		2280	1570	1480	1200	375
turbidity	----	E121	0.10	NTU		220	357	356	7.17	8.95
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		8.27	70.1	57.3	0.0421	0.0306
bromide	24959-67-9	E235.Br-L	0.050	mg/L		1.90	1.02	<1.00 DLDS	0.697	<0.050
chloride	16887-00-6	E235.Cl	0.50	mg/L		395	236	205	169	0.56
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.400 DLDS	<0.400 DLDS	<0.400 DLDS	<0.200 DLDS	0.043
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.100 DLDS, HTD	<0.100 DLDS	<0.100 DLDS	<0.0500 DLDS	0.288
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0200 DLDS, HTD	<0.0200 DLDS	<0.0200 DLDS	<0.0100 DLDS	0.0014
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		<6.00 DLDS	<6.00 DLDS	<6.00 DLDS	90.2	79.6
Organic / Inorganic Carbon										
carbon, total inorganic [TIC]	----	E354-L	0.50	mg/L		449	406	372	216	58.0
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		71.5	57.3	47.7	7.88	2.44
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		347	247	251	235	71.2
iron, total	7439-89-6	E420	0.010	mg/L		13.4	54.4	52.7	0.963	0.440
magnesium, total	7439-95-4	E420	0.0050	mg/L		192	85.5	86.4	91.2	29.6
manganese, total	7439-96-5	E420	0.00010	mg/L		9.10	4.05	5.28	0.865	0.292
potassium, total	7440-09-7	E420	0.050	mg/L		20.1	73.5	59.6	5.00	1.71
sodium, total	7440-23-5	E420	0.050	mg/L		351	206	189	108	10.7
sulfur, total	7704-34-9	E420	0.50	mg/L		3.25	2.04	1.89	35.9	29.5

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	OW1	OW6	MW05-8S	MW08-8D	MW11-13D
					Client sampling date / time	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022
						VA22C6911-001	VA22C6911-002	VA22C6911-003	VA22C6911-004	VA22C6911-005
						Result	Result	Result	Result	Result
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0053	0.0076	0.0054	0.0019	0.0022
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00029	0.00024	0.00025	0.00018	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00369	0.0284	0.0208	0.00147	0.00226
barium, dissolved	7440-39-3	E421	0.00010	mg/L		1.42	0.977	1.13	0.105	0.0962
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000100	<0.000050	<0.000100	<0.000050	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L		1.09	0.956	0.994	0.474	0.014
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.000132	<0.0000050	<0.0000100	0.0000248	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L		305	218	240	218	64.9
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000020	0.000096	0.000044	0.000017	<0.000010
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		0.00196	0.00350	0.00278	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.0143	0.00453	0.0101	0.00083	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00402	<0.00020	<0.00040	0.00036	0.00021
iron, dissolved	7439-89-6	E421	0.010	mg/L		4.28	52.2	53.3	0.427	0.035
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000100	<0.000050	<0.000100	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0073	0.0103	0.0107	0.0022	<0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		176	81.3	83.2	91.0	27.6
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		8.47	3.82	5.20	0.859	0.187
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		0.0000187	<0.0000050	<0.0000050	<0.0000050	0.0000310
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00396	0.000937	0.00267	0.00308	0.00166
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.127	0.0267	0.0367	0.0245	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		0.108	0.418	0.216	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		16.6	64.4	53.0	4.76	1.49
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00370	0.0122	0.00908	0.00142	0.00046
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000206	0.000235	<0.000100	<0.000050	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L		19.5	22.2	20.7	9.60	8.72
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000020	0.000012	<0.000020	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L		331	195	188	105	9.73
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		3.42	2.01	2.17	1.06	0.418
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		2.16	1.54	<1.00	35.0	28.9

Analytical Results

Sub-Matrix: Water (Matrix: Water)			Client sample ID		OW1	OW6	MW05-8S	MW08-8D	MW11-13D
			Client sampling date / time		02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022
Analyte	CAS Number	Method	LOR	Unit	VA22C6911-001	VA22C6911-002	VA22C6911-003	VA22C6911-004	VA22C6911-005
					Result	Result	Result	Result	Result
Dissolved Metals									
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00040	<0.00020	<0.00040	<0.00020	<0.00020
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000020	<0.000010	<0.000020	<0.000010	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00020	<0.00010	<0.00020	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00049	0.00029	0.00026	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00167	0.00379	0.00210	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.00033	0.00022	<0.00020	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00814	0.000096	0.000334	0.00791	0.00110
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00312	0.00794	0.00570	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0021	<0.0010	<0.0020	0.0021	<0.0010
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	0.00702	0.00743	0.00757	0.00028	<0.00020
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Aggregate Organics									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	263	202	183	27	16
Hydrocarbons									
EPH (C10-C19)	----	E601A	250	µg/L	<250	<250	<250	----	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	<250	<250	----	----
HEPHw	----	EC600A	250	µg/L	<250	<250	<250	----	----
LEPHw	----	EC600A	250	µg/L	<250	<250	<250	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%	89.3	89.8	89.8	----	----
Polycyclic Aromatic Hydrocarbons									
acenaphthene	83-32-9	E641A	0.010	µg/L	<0.020 DLCI	0.145	0.083	----	----
acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	<0.010	<0.010	----	----
acridine	260-94-6	E641A	0.010	µg/L	0.014	<0.010	<0.010	----	----
anthracene	120-12-7	E641A	0.010	µg/L	<0.010	<0.010	<0.010	----	----
benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	<0.010	<0.010	----	----
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	<0.0050	<0.0050	----	----
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	<0.010	<0.010	----	----
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	<0.015	<0.015	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	OW1	OW6	MW05-8S	MW08-8D	MW11-13D
					Client sampling date / time	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022
						VA22C6911-001	VA22C6911-002	VA22C6911-003	VA22C6911-004	VA22C6911-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
chrysene	218-01-9	E641A	0.010	µg/L		0.027	<0.010	<0.010	----	----
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	----
fluoranthene	206-44-0	E641A	0.010	µg/L		0.041	<0.010	<0.010	----	----
fluorene	86-73-7	E641A	0.010	µg/L		0.014	0.074	0.044	----	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	0.592	0.069	----	----
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		0.018	0.025	0.025	----	----
naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	0.781	0.164	----	----
phenanthrene	85-01-8	E641A	0.020	µg/L		0.043	<0.020	<0.020	----	----
pyrene	129-00-0	E641A	0.010	µg/L		0.055	<0.010	<0.010	----	----
quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.050	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%		80.8	78.3	80.6	----	----
naphthalene-d8	1146-65-2	E641A	0.1	%		86.6	91.2	92.7	----	----
phenanthrene-d10	1517-22-2	E641A	0.1	%		102	93.6	96.2	----	----

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-14	CP	PM	DUP2	OW7
					Client sampling date / time	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022	03-Nov-2022
						VA22C6911-006	VA22C6911-007	VA22C6911-008	VA22C6911-009	VA22C6911-010
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		1680	132	276	1530	1350
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	4.8	<1.0	<1.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	2.4	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		1680	132	281	1530	1350
conductivity	----	E100	2.0	µS/cm		3510	290	739	3580	3170
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		1110	----	----	1500	1550
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		1180	----	----	1600	1750
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		----	151	369	----	----
pH	----	E108	0.10	pH units		7.05	8.27	8.31	7.00	6.89
solids, total dissolved [TDS]	----	E162	10	mg/L		1880	191	502	2330	2130
turbidity	----	E121	0.10	NTU		310	<0.10	9.48	226	66.9
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		124	<0.0050	0.0162	8.64	5.47
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<1.00 DLDS	<0.050	<0.250 DLDS	1.94	2.85
chloride	16887-00-6	E235.Cl	0.50	mg/L		222	0.86	42.8	389	354
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.400 DLDS	0.041	<0.100 DLDS	<0.400 DLDS	<0.400 DLDS
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.100 DLDS	0.0602	0.0786	<0.100 DLDS	<0.100 DLDS
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0200 DLDS	0.0137	<0.0050 DLDS	<0.0200 DLDS	<0.0200 DLDS
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		<6.00 DLDS	20.1	52.4	<6.00 DLDS	<6.00 DLDS
Organic / Inorganic Carbon										
carbon, total inorganic [TIC]	----	E354-L	0.50	mg/L		513	35.4	71.7	516	416
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		84.1	<0.50	5.20	72.6	47.8
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		----	0.0043	0.0094	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		----	0.00028	<0.00010	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		----	0.00090	0.00086	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		----	0.0865	0.112	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		----	<0.000100	<0.000100	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		----	<0.000050	<0.000050	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-14	CP	PM	DUP2	OW7
					Client sampling date / time	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022	03-Nov-2022
						VA22C6911-006	VA22C6911-007	VA22C6911-008	VA22C6911-009	VA22C6911-010
						Result	Result	Result	Result	Result
Total Metals										
boron, total	7440-42-8	E420	0.010	mg/L		----	<0.010	0.043	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		----	0.0000102	0.000103	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		257	41.7	111	332	420
cesium, total	7440-46-2	E420	0.000010	mg/L		----	<0.000010	<0.000010	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		----	<0.00050	<0.00050	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		----	<0.00010	0.00024	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		----	0.00132	0.00403	----	----
iron, total	7439-89-6	E420	0.010	mg/L		63.7	0.014	0.056	13.4	6.64
lead, total	7439-92-1	E420	0.000050	mg/L		----	0.000056	0.000096	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		----	<0.0010	0.0025	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		130	11.3	22.4	187	171
manganese, total	7439-96-5	E420	0.00010	mg/L		4.04	0.0382	0.172	9.15	12.1
mercury, total	7439-97-6	E508	0.0000050	mg/L		----	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		----	0.00173	0.00317	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		----	<0.00050	0.00385	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		----	<0.050	<0.050	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		105	0.878	2.96	20.3	14.4
rubidium, total	7440-17-7	E420	0.00020	mg/L		----	0.00057	0.00084	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		----	0.00155	0.000121	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		----	4.43	8.27	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		----	<0.000010	<0.000010	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		267	4.52	19.2	350	173
strontium, total	7440-24-6	E420	0.00020	mg/L		----	0.261	0.579	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		2.68	7.07	19.7	3.02	2.72
tellurium, total	13494-80-9	E420	0.00020	mg/L		----	<0.00020	<0.00020	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		----	<0.000010	<0.000010	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L		----	<0.00010	<0.00010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		----	<0.00010	0.00330	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		----	<0.00030	0.00034	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		----	<0.00010	0.00022	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-14	CP	PM	DUP2	OW7
					Client sampling date / time	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022	03-Nov-2022
						VA22C6911-006	VA22C6911-007	VA22C6911-008	VA22C6911-009	VA22C6911-010
						Result	Result	Result	Result	Result
Total Metals										
uranium, total	7440-61-1	E420	0.000010	mg/L		----	0.000576	0.00145	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		----	0.00285	0.00050	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		----	<0.0030	1.52	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		----	<0.00020	<0.00020	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0107	----	----	0.0051	0.0050
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00044	----	----	0.00031	<0.00050
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.0281	----	----	0.00373	0.00360
barium, dissolved	7440-39-3	E421	0.00010	mg/L		1.08	----	----	1.42	0.990
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	----	----	<0.000100	<0.000100
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	----	----	<0.000100	<0.000250
boron, dissolved	7440-42-8	E421	0.010	mg/L		1.98	----	----	1.17	0.342
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	----	----	0.000149	0.000144
calcium, dissolved	7440-70-2	E421	0.050	mg/L		237	----	----	311	373
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		0.000234	----	----	<0.000020	<0.000050
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		0.00438	----	----	0.00177	0.00081
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00603	----	----	0.0140	0.0121
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00029	----	----	0.00383	0.00272
iron, dissolved	7439-89-6	E421	0.010	mg/L		33.4	----	----	4.18	4.26
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	----	----	<0.000100	<0.000250
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0133	----	----	0.0074	0.0098
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		127	----	----	177	151
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		2.67	----	----	8.33	10.7
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	----	----	0.0000181	0.0000136
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000814	----	----	0.00389	0.00204
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.0302	----	----	0.125	0.0761
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		0.502	----	----	0.124	<0.250
potassium, dissolved	7440-09-7	E421	0.050	mg/L		107	----	----	16.9	13.0
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.0187	----	----	0.00386	0.00244
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000238	----	----	0.000204	0.000347

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-14	CP	PM	DUP2	OW7
					Client sampling date / time	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022	03-Nov-2022
						VA22C6911-006	VA22C6911-007	VA22C6911-008	VA22C6911-009	VA22C6911-010
						Result	Result	Result	Result	Result
Dissolved Metals										
silicon, dissolved	7440-21-3	E421	0.050	mg/L		24.1	----	----	19.4	16.4
silver, dissolved	7440-22-4	E421	0.000010	mg/L		0.000016	----	----	<0.000020	<0.000050
sodium, dissolved	7440-23-5	E421	0.050	mg/L		269	----	----	326	156
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		2.55	----	----	3.37	3.12
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		2.12	----	----	2.39	<2.50
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	----	----	<0.00040	<0.00100
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	----	----	<0.000020	<0.000050
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	----	----	<0.00020	<0.00050
tin, dissolved	7440-31-5	E421	0.00010	mg/L		0.00035	----	----	0.00052	<0.00050
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		0.00476	----	----	0.00184	<0.00150
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		0.00022	----	----	0.00032	<0.00050
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000140	----	----	0.00812	0.00651
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00979	----	----	0.00298	<0.00250
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0023	----	----	0.0023	<0.0050
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		0.00810	----	----	0.00696	0.00485
dissolved mercury filtration location	----	EP509	-	-		Field	----	----	Field	Field
dissolved metals filtration location	----	EP421	-	-		Field	----	----	Field	Field
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		324	<10	17	260	158
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.50	µg/L		2.96	----	----	2.89	----
ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	----	----	<0.50	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		1.72	----	----	1.80	----
styrene	100-42-5	E611A	0.50	µg/L		<0.50	----	----	<0.50	----
toluene	108-88-3	E611A	0.50	µg/L		1.07	----	----	0.83	----
xylene, m+p-	179601-23-1	E611A	0.40	µg/L		0.65	----	----	0.51	----
xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	----	----	<0.30	----
xylenes, total	1330-20-7	E611A	0.50	µg/L		0.65	----	----	0.51	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		----	----	----	<250	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-14	CP	PM	DUP2	OW7
					Client sampling date / time	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022	03-Nov-2022
						VA22C6911-006	VA22C6911-007	VA22C6911-008	VA22C6911-009	VA22C6911-010
						Result	Result	Result	Result	Result
Hydrocarbons										
EPH (C19-C32)	----	E601A	250	µg/L		----	----	----	<250	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	----	----	<100	----
HEPHw	----	EC600A	250	µg/L		----	----	----	<250	----
LEPHw	----	EC600A	250	µg/L		----	----	----	<250	----
VPHw	----	EC580A	100	µg/L		<100	----	----	<100	----
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		----	----	----	92.8	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		75.1	----	----	78.4	----
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		104	----	----	106	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		102	----	----	103	----
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L		----	----	----	<0.010	----
acenaphthylene	208-96-8	E641A	0.010	µg/L		----	----	----	<0.010	----
acridine	260-94-6	E641A	0.010	µg/L		----	----	----	0.018	----
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		----	----	----	0.017	----
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		----	----	----	<0.0050	----
fluoranthene	206-44-0	E641A	0.010	µg/L		----	----	----	0.061	----
fluorene	86-73-7	E641A	0.010	µg/L		----	----	----	0.014	----
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		----	----	----	<0.010	----
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		----	----	----	<0.010	----
naphthalene	91-20-3	E641A	0.050	µg/L		----	----	----	<0.050	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-14	CP	PM	DUP2	OW7
					Client sampling date / time	02-Nov-2022	02-Nov-2022	02-Nov-2022	02-Nov-2022	03-Nov-2022
						VA22C6911-006	VA22C6911-007	VA22C6911-008	VA22C6911-009	VA22C6911-010
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
phenanthrene	85-01-8	E641A	0.020	µg/L		----	----	----	0.061	----
pyrene	129-00-0	E641A	0.010	µg/L		----	----	----	0.083	----
quinoline	91-22-5	E641A	0.050	µg/L		----	----	----	<0.050	----
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%		----	----	----	60.8	----
naphthalene-d8	1146-65-2	E641A	0.1	%		----	----	----	90.0	----
phenanthrene-d10	1517-22-2	E641A	0.1	%		----	----	----	93.0	----

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

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	MW11-13S	SF	----	----	----
					Client sampling date / time	03-Nov-2022	03-Nov-2022	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22C6911-011	VA22C6911-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		277	126	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	5.2	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L		<1.0	2.6	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		277	131	----	----	----
conductivity	----	E100	2.0	µS/cm		803	302	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		377	----	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		424	----	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		----	160	----	----	----
pH	----	E108	0.10	pH units		8.10	8.32	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		514	188	----	----	----
turbidity	----	E121	0.10	NTU		23.3	8.90	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0122	0.0060	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		0.916	<0.050	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		75.8	2.18	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.100 DLDS	0.036	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0748	0.142	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0050 DLDS	0.0032	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		37.6	21.2	----	----	----
Organic / Inorganic Carbon										
carbon, total inorganic [TIC]	----	E354-L	0.50	mg/L		81.8	34.6	----	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		3.23	0.90	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		----	0.0104	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		----	0.00024	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		----	0.00161	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		----	0.0886	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		----	<0.000100	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		----	<0.000050	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	MW11-13S	SF	----	----	----
					Client sampling date / time	03-Nov-2022	03-Nov-2022	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22C6911-011	VA22C6911-012	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
boron, total	7440-42-8	E420	0.010	mg/L		----	<0.010	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		----	0.0000105	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		116	42.5	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L		----	<0.000010	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		----	0.00178	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		----	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		----	0.00231	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		2.06	2.61	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		----	0.000926	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		----	<0.0010	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		32.7	13.2	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.122	0.0123	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		----	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		----	0.00125	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		----	0.00090	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		----	<0.050	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		2.57	0.820	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		----	0.00031	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		----	0.00105	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		----	4.30	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		----	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		22.5	3.92	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		----	0.266	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		13.9	7.48	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		----	<0.00020	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		----	<0.000010	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L		----	<0.00010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		----	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		----	<0.00030	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		----	<0.00010	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	MW11-13S	SF	----	----	----
					Client sampling date / time	03-Nov-2022	03-Nov-2022	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22C6911-011	VA22C6911-012	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
uranium, total	7440-61-1	E420	0.000010	mg/L		----	0.000690	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		----	0.00321	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		----	<0.0030	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		----	<0.00020	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0017	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00020	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00097	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.136	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.024	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000131	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		102	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00156	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0013	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		29.8	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00076	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00287	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00050	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		<0.050	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		2.30	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00052	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.00148	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	MW11-13S	SF	----	----	----
					Client sampling date / time	03-Nov-2022	03-Nov-2022	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22C6911-011	VA22C6911-012	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
silicon, dissolved	7440-21-3	E421	0.050	mg/L		6.95	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		21.0	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.764	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		13.6	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		0.000014	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00486	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00070	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0036	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00020	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		<10	<10	----	----	----

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

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C6911**	Page	: 1 of 36
Client	: **WSP E&I Canada Limited**	Laboratory	: Vancouver - Environmental
Contact	: Maylee Eisbrenner	Account Manager	: Selam Worku
Address	: 3456 Opie Crescent Prince George BC Canada V2N 2P9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250 564 3243	Telephone	: +1 604 253 4188
Project	: KX05593.3	Date Samples Received	: 04-Nov-2022 09:00
PO	: KX05593.3.***.1110.573000	Issue Date	: 16-Nov-2022 16:05
C-O-C number	: 17-717380		
Sampler	: ME		
Site	: ----		
Quote number	: VA21-WOOD100-015		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Dissolved Metals	QC-738712-002	----	sulfur, dissolved	7704-34-9	E421	79.7 % MES	80.0-120%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Matrix Spike (MS) Recoveries								
Dissolved Metals	VA22C6911-002	OW6	silver, dissolved	7440-22-4	E421	65.6 % MES	70.0-130%	Recovery less than lower data quality objective

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW11-13S	E559-L	03-Nov-2022	----	----	----		13-Nov-2022	28 days	10 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) OW7	E559-L	03-Nov-2022	----	----	----		13-Nov-2022	28 days	10 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) SF	E559-L	03-Nov-2022	----	----	----		13-Nov-2022	28 days	10 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) CP	E559-L	02-Nov-2022	----	----	----		13-Nov-2022	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) DUP2	E559-L	02-Nov-2022	----	----	----		13-Nov-2022	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW05-8S	E559-L	02-Nov-2022	----	----	----		13-Nov-2022	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW08-8D	E559-L	02-Nov-2022	----	----	----		13-Nov-2022	28 days	11 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
MW11-13D	E559-L	02-Nov-2022	----	----	----		13-Nov-2022	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
MW11-14	E559-L	02-Nov-2022	----	----	----		13-Nov-2022	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
OW1	E559-L	02-Nov-2022	----	----	----		13-Nov-2022	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
OW6	E559-L	02-Nov-2022	----	----	----		13-Nov-2022	28 days	11 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
PM	E559-L	02-Nov-2022	----	----	----		13-Nov-2022	28 days	11 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW11-13S	E298	03-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
OW7	E298	03-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SF	E298	03-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
CP	E298	02-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	14 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
DUP2	E298	02-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW05-8S	E298	02-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW08-8D	E298	02-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW11-13D	E298	02-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW11-14	E298	02-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
OW1	E298	02-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
OW6	E298	02-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
PM	E298	02-Nov-2022	07-Nov-2022	----	----		15-Nov-2022	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
MW11-13S	E235.Br-L	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE OW7	E235.Br-L	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SF	E235.Br-L	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE CP	E235.Br-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE DUP2	E235.Br-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW05-8S	E235.Br-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW08-8D	E235.Br-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW11-13D	E235.Br-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW11-14	E235.Br-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE OW1	E235.Br-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
OW6	E235.Br-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
PM	E235.Br-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW11-13S	E235.Cl	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
OW7	E235.Cl	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
SF	E235.Cl	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
CP	E235.Cl	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
DUP2	E235.Cl	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW05-8S	E235.Cl	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW08-8D	E235.Cl	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE MW11-13D	E235.Cl	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW11-14	E235.Cl	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE OW1	E235.Cl	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE OW6	E235.Cl	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE PM	E235.Cl	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW11-13S	E235.F	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE OW7	E235.F	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SF	E235.F	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE CP	E235.F	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE DUP2	E235.F	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW05-8S	E235.F	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW08-8D	E235.F	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW11-13D	E235.F	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW11-14	E235.F	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE OW1	E235.F	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE OW6	E235.F	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE PM	E235.F	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW11-13S	E235.NO3-L	03-Nov-2022	05-Nov-2022	3 days	3 days	✓	05-Nov-2022	3 days	0 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE OW7	E235.NO3-L	03-Nov-2022	05-Nov-2022	3 days	3 days	✓	05-Nov-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SF	E235.NO3-L	03-Nov-2022	05-Nov-2022	3 days	3 days	✓	05-Nov-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE CP	E235.NO3-L	02-Nov-2022	05-Nov-2022	3 days	4 days	✓	05-Nov-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE DUP2	E235.NO3-L	02-Nov-2022	05-Nov-2022	3 days	4 days	✓	05-Nov-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW05-8S	E235.NO3-L	02-Nov-2022	05-Nov-2022	3 days	4 days	✓	05-Nov-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW08-8D	E235.NO3-L	02-Nov-2022	05-Nov-2022	3 days	4 days	✓	05-Nov-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW11-13D	E235.NO3-L	02-Nov-2022	05-Nov-2022	3 days	4 days	✓	05-Nov-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW11-14	E235.NO3-L	02-Nov-2022	05-Nov-2022	3 days	4 days	✓	05-Nov-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE OW1	E235.NO3-L	02-Nov-2022	05-Nov-2022	3 days	4 days	✓	05-Nov-2022	3 days	0 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
OW6	E235.NO3-L	02-Nov-2022	05-Nov-2022	3 days	4 days	✓	05-Nov-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
PM	E235.NO3-L	02-Nov-2022	05-Nov-2022	3 days	4 days	✓	05-Nov-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW11-13S	E235.NO2-L	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
OW7	E235.NO2-L	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SF	E235.NO2-L	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
CP	E235.NO2-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	4 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
DUP2	E235.NO2-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	4 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW05-8S	E235.NO2-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	4 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW08-8D	E235.NO2-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW11-13D	E235.NO2-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	4 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW11-14	E235.NO2-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	4 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE OW1	E235.NO2-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	4 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE OW6	E235.NO2-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	4 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE PM	E235.NO2-L	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	3 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW11-13S	E235.SO4	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE OW7	E235.SO4	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SF	E235.SO4	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE CP	E235.SO4	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
DUP2	E235.SO4	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW05-8S	E235.SO4	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW08-8D	E235.SO4	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW11-13D	E235.SO4	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW11-14	E235.SO4	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
OW1	E235.SO4	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
OW6	E235.SO4	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
PM	E235.SO4	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW11-13S	E509	03-Nov-2022	07-Nov-2022	----	----		07-Nov-2022	28 days	4 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) OW7	E509	03-Nov-2022	07-Nov-2022	----	----		07-Nov-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) DUP2	E509	02-Nov-2022	07-Nov-2022	----	----		07-Nov-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW05-8S	E509	02-Nov-2022	07-Nov-2022	----	----		07-Nov-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW08-8D	E509	02-Nov-2022	07-Nov-2022	----	----		07-Nov-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW11-13D	E509	02-Nov-2022	07-Nov-2022	----	----		07-Nov-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW11-14	E509	02-Nov-2022	07-Nov-2022	----	----		07-Nov-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) OW1	E509	02-Nov-2022	07-Nov-2022	----	----		07-Nov-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) OW6	E509	02-Nov-2022	07-Nov-2022	----	----		07-Nov-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW11-13S	E421	03-Nov-2022	10-Nov-2022	----	----		15-Nov-2022	180 days	13 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) OW7	E421	03-Nov-2022	10-Nov-2022	----	----		15-Nov-2022	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) DUP2	E421	02-Nov-2022	10-Nov-2022	----	----		15-Nov-2022	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW05-8S	E421	02-Nov-2022	10-Nov-2022	----	----		15-Nov-2022	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW08-8D	E421	02-Nov-2022	10-Nov-2022	----	----		15-Nov-2022	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW11-13D	E421	02-Nov-2022	10-Nov-2022	----	----		15-Nov-2022	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW11-14	E421	02-Nov-2022	10-Nov-2022	----	----		15-Nov-2022	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) OW1	E421	02-Nov-2022	10-Nov-2022	----	----		15-Nov-2022	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) OW6	E421	02-Nov-2022	10-Nov-2022	----	----		15-Nov-2022	180 days	14 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP2	E601A	02-Nov-2022	15-Nov-2022	14 days	14 days	✓	16-Nov-2022	40 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW05-8S	E601A	02-Nov-2022	15-Nov-2022	14 days	14 days	✓	16-Nov-2022	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
OW1	E601A	02-Nov-2022	15-Nov-2022	14 days	14 days	✓	16-Nov-2022	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
OW6	E601A	02-Nov-2022	15-Nov-2022	14 days	14 days	✓	16-Nov-2022	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
DUP2	E581.VH+F1	02-Nov-2022	14-Nov-2022	----	----		15-Nov-2022	14 days	14 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW11-14	E581.VH+F1	02-Nov-2022	14-Nov-2022	----	----		15-Nov-2022	14 days	14 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE										
MW11-13S	E354-L	03-Nov-2022	----	----	----		08-Nov-2022	14 days	5 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE										
OW7	E354-L	03-Nov-2022	----	----	----		08-Nov-2022	14 days	5 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE										
SF	E354-L	03-Nov-2022	----	----	----		08-Nov-2022	14 days	5 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE										
CP	E354-L	02-Nov-2022	----	----	----		08-Nov-2022	14 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE DUP2	E354-L	02-Nov-2022	----	----	----		08-Nov-2022	14 days	6 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE MW05-8S	E354-L	02-Nov-2022	----	----	----		08-Nov-2022	14 days	6 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE MW08-8D	E354-L	02-Nov-2022	----	----	----		08-Nov-2022	14 days	6 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE MW11-13D	E354-L	02-Nov-2022	----	----	----		08-Nov-2022	14 days	6 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE MW11-14	E354-L	02-Nov-2022	----	----	----		08-Nov-2022	14 days	6 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE OW1	E354-L	02-Nov-2022	----	----	----		08-Nov-2022	14 days	6 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE OW6	E354-L	02-Nov-2022	----	----	----		08-Nov-2022	14 days	6 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Combustion (Low Level)										
HDPE PM	E354-L	02-Nov-2022	----	----	----		08-Nov-2022	14 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW11-13S	E355-L	03-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) OW7	E355-L	03-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	5 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SF	E355-L	03-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	5 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) CP	E355-L	02-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) DUP2	E355-L	02-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW05-8S	E355-L	02-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW08-8D	E355-L	02-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW11-13D	E355-L	02-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) MW11-14	E355-L	02-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) OW1	E355-L	02-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) OW6	E355-L	02-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) PM	E355-L	02-Nov-2022	07-Nov-2022	----	----		08-Nov-2022	28 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW11-13S	E290	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE OW7	E290	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SF	E290	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE CP	E290	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE DUP2	E290	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW05-8S	E290	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW08-8D	E290	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE MW11-13D	E290	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW11-14	E290	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE OW1	E290	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE OW6	E290	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE PM	E290	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	14 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE MW11-13S	E100	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE OW7	E100	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE SF	E100	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE CP	E100	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE DUP2	E100	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE MW05-8S	E100	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE MW08-8D	E100	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE MW11-13D	E100	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE MW11-14	E100	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE OW1	E100	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE OW6	E100	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE PM	E100	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	28 days	4 days	✓
Physical Tests : pH by Meter										
HDPE CP	E108	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE DUP2	E108	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW05-8S	E108	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW08-8D	E108	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW11-13D	E108	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW11-13S	E108	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW11-14	E108	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE OW1	E108	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE OW6	E108	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE OW7	E108	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE PM	E108	02-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SF	E108	03-Nov-2022	05-Nov-2022	----	----		05-Nov-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE MW11-13S	E162	03-Nov-2022	----	----	----		06-Nov-2022	7 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE OW7	E162	03-Nov-2022	----	----	----		06-Nov-2022	7 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SF	E162	03-Nov-2022	----	----	----		06-Nov-2022	7 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE CP	E162	02-Nov-2022	----	----	----		06-Nov-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE DUP2	E162	02-Nov-2022	----	----	----		06-Nov-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MW05-8S	E162	02-Nov-2022	----	----	----		06-Nov-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MW08-8D	E162	02-Nov-2022	----	----	----		06-Nov-2022	7 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE MW11-13D	E162	02-Nov-2022	----	----	----		06-Nov-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE MW11-14	E162	02-Nov-2022	----	----	----		06-Nov-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE OW1	E162	02-Nov-2022	----	----	----		06-Nov-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE OW6	E162	02-Nov-2022	----	----	----		06-Nov-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE PM	E162	02-Nov-2022	----	----	----		06-Nov-2022	7 days	4 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE MW11-13S	E121	03-Nov-2022	----	----	----		05-Nov-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE OW7	E121	03-Nov-2022	----	----	----		05-Nov-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE SF	E121	03-Nov-2022	----	----	----		05-Nov-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE CP	E121	02-Nov-2022	----	----	----		05-Nov-2022	3 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE DUP2	E121	02-Nov-2022	----	----	----		05-Nov-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE MW05-8S	E121	02-Nov-2022	----	----	----		05-Nov-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE MW08-8D	E121	02-Nov-2022	----	----	----		05-Nov-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE MW11-13D	E121	02-Nov-2022	----	----	----		05-Nov-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE MW11-14	E121	02-Nov-2022	----	----	----		05-Nov-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE OW1	E121	02-Nov-2022	----	----	----		05-Nov-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE OW6	E121	02-Nov-2022	----	----	----		05-Nov-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE PM	E121	02-Nov-2022	----	----	----		05-Nov-2022	3 days	3 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP2	E641A	02-Nov-2022	15-Nov-2022	14 days	14 days	✓	15-Nov-2022	40 days	0 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW05-8S	E641A	02-Nov-2022	15-Nov-2022	14 days	14 days	✓	15-Nov-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
OW1	E641A	02-Nov-2022	15-Nov-2022	14 days	14 days	✓	15-Nov-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
OW6	E641A	02-Nov-2022	15-Nov-2022	14 days	14 days	✓	15-Nov-2022	40 days	0 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SF	E508	03-Nov-2022	11-Nov-2022	----	----		11-Nov-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
CP	E508	02-Nov-2022	11-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
PM	E508	02-Nov-2022	11-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
MW11-13S	E420	03-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	6 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
OW7	E420	03-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	6 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SF	E420	03-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) CP	E420	02-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	7 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) DUP2	E420	02-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	7 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) MW05-8S	E420	02-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	7 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) MW08-8D	E420	02-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	7 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) MW11-13D	E420	02-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	7 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) MW11-14	E420	02-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	7 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) OW1	E420	02-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	7 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) OW6	E420	02-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	7 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) PM	E420	02-Nov-2022	08-Nov-2022	----	----		08-Nov-2022	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP2	E611A	02-Nov-2022	14-Nov-2022	----	----		15-Nov-2022	14 days	14 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW11-14	E611A	02-Nov-2022	14-Nov-2022	----	----		15-Nov-2022	14 days	14 days	✓

Legend & Qualifier Definitions

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

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	731955	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	734388	1	18	5.5	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	731959	1	17	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	741741	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	741386	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	731958	1	17	5.8	5.0	✓
Conductivity in Water	E100	731956	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	733510	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	738712	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	731957	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	731960	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	731961	1	17	5.8	5.0	✓
pH by Meter	E108	731954	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	731962	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	732675	2	32	6.2	5.0	✓
Total Inorganic Carbon by Combustion (Low Level)	E354-L	734474	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	739890	1	9	11.1	5.0	✓
Total metals in Water by CRC ICPMS	E420	734523	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	734387	1	12	8.3	5.0	✓
Turbidity by Nephelometry	E121	731928	3	46	6.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	741743	1	8	12.5	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	731955	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	734388	1	18	5.5	5.0	✓
BC PHCs - EPH by GC-FID	E601A	743126	2	20	10.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	731959	1	17	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	741741	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	741386	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	731958	1	17	5.8	5.0	✓
Conductivity in Water	E100	731956	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	733510	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	738712	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	731957	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	731960	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	731961	1	17	5.8	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	743127	2	17	11.7	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
pH by Meter	E108	731954	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	731962	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	732675	2	32	6.2	5.0	✓
Total Inorganic Carbon by Combustion (Low Level)	E354-L	734474	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	739890	1	9	11.1	5.0	✓
Total metals in Water by CRC ICPMS	E420	734523	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	734387	1	12	8.3	5.0	✓
Turbidity by Nephelometry	E121	731928	3	46	6.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	741743	1	8	12.5	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	731955	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	734388	1	18	5.5	5.0	✓
BC PHCs - EPH by GC-FID	E601A	743126	2	20	10.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	731959	1	17	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	741741	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	741386	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	731958	1	17	5.8	5.0	✓
Conductivity in Water	E100	731956	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	733510	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	738712	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	731957	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	731960	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	731961	1	17	5.8	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	743127	2	17	11.7	5.0	✓
Sulfate in Water by IC	E235.SO4	731962	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	732675	2	32	6.2	5.0	✓
Total Inorganic Carbon by Combustion (Low Level)	E354-L	734474	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	739890	1	9	11.1	5.0	✓
Total metals in Water by CRC ICPMS	E420	734523	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	734387	1	12	8.3	5.0	✓
Turbidity by Nephelometry	E121	731928	3	46	6.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	741743	1	8	12.5	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	734388	1	18	5.5	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	731959	1	17	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	741741	1	10	10.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	741386	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	731958	1	17	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	733510	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Dissolved Metals in Water by CRC ICPMS	E421	738712	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	731957	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	731960	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	731961	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	731962	1	17	5.8	5.0	✓
Total Inorganic Carbon by Combustion (Low Level)	E354-L	734474	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	739890	1	9	11.1	5.0	✓
Total metals in Water by CRC ICPMS	E420	734523	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	734387	1	12	8.3	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Inorganic Carbon by Combustion (Low Level)	E354-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Total Inorganic Carbon is determined by the high temperature combustion method with measurement by an infrared detector, where the sample is acidified in a reaction chamber to convert all inorganic carbons (carbonates) to carbon dioxide for analysis.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Calgary - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Calgary - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Calgary - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Calgary - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
VPH: VH-BTEX-Styrene	EC580A Calgary - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Calgary - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 Vancouver - Environmental	Water		Preparation for Total Organic Carbon by Combustion

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 Calgary - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Calgary - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **VA22C6911**	Page	: 1 of 22
Client	: WSP E&I Canada Limited	Laboratory	: Vancouver - Environmental
Contact	: Maylee Eisbrenner	Account Manager	: Selam Worku
Address	: 3456 Opie Crescent Prince George BC Canada V2N 2P9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: KX05593.3	Date Samples Received	: 04-Nov-2022 09:00
PO	: KX05593.3.***.1110.573000	Date Analysis Commenced	: 05-Nov-2022
C-O-C number	: 17-717380	Issue Date	: 16-Nov-2022 16:05
Sampler	: ME 250 564 3243		
Site	: ----		
Quote number	: VA21-WOOD100-015		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Cynthia Bauer	Organic Supervisor	Calgary Organics, Calgary, Alberta
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
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Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Inorganics, Burnaby, British Columbia
Sorina Motea	Laboratory Analyst	Calgary Organics, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 731928)											
VA22C6729-001	Anonymous	turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 731929)											
VA22C6911-003	MW05-8S	turbidity	----	E121	0.10	NTU	356	357	0.280%	15%	----
Physical Tests (QC Lot: 731954)											
VA22C6911-002	OW6	pH	----	E108	0.10	pH units	6.97	6.94	0.431%	4%	----
Physical Tests (QC Lot: 731955)											
VA22C6911-002	OW6	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	1220	1190	2.35%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	1220	1190	2.35%	20%	----
Physical Tests (QC Lot: 731956)											
VA22C6911-002	OW6	conductivity	----	E100	2.0	µS/cm	2850	2840	0.351%	10%	----
Physical Tests (QC Lot: 732062)											
VA22C6866-003	Anonymous	turbidity	----	E121	0.10	NTU	19.4	18.4	5.50%	15%	----
Physical Tests (QC Lot: 732675)											
VA22C6704-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1580	1610	2.35%	20%	----
Physical Tests (QC Lot: 732676)											
VA22C6911-005	MW11-13D	solids, total dissolved [TDS]	----	E162	20	mg/L	375	363	3.25%	20%	----
Anions and Nutrients (QC Lot: 731957)											
VA22C6911-001	OW1	fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 731958)											
VA22C6911-001	OW1	chloride	16887-00-6	E235.Cl	10.0	mg/L	395	398	0.770%	20%	----
Anions and Nutrients (QC Lot: 731959)											
VA22C6911-001	OW1	bromide	24959-67-9	E235.Br-L	1.00	mg/L	1.90	1.86	0.037	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 731960)											
VA22C6911-001	OW1	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 731961)											
VA22C6911-001	OW1	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	<0.0200	<0.0200	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 731962)											
VA22C6911-001	OW1	sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	<6.00	<6.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 734388)											
VA22C6905-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 734387)											
VA22C6911-001	OW1	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	71.5	74.4	3.88%	20%	----
Organic / Inorganic Carbon (QC Lot: 734474)											
VA22C6911-001	OW1	carbon, total inorganic [TIC]	----	E354-L	10.0	mg/L	449	439	2.28%	20%	----
Total Metals (QC Lot: 734523)											
VA22C6911-001	OW1	aluminum, total	7429-90-5	E420	0.0060	mg/L	7.67	7.63	0.527%	20%	----
		antimony, total	7440-36-0	E420	0.00020	mg/L	0.00131	0.00127	0.00004	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00020	mg/L	0.0100	0.00992	1.23%	20%	----
		barium, total	7440-39-3	E420	0.00020	mg/L	1.71	1.64	4.49%	20%	----
		beryllium, total	7440-41-7	E420	0.000040	mg/L	0.000213	0.000222	0.000009	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.020	mg/L	1.46	1.48	0.839%	20%	----
		cadmium, total	7440-43-9	E420	0.0000100	mg/L	0.000884	0.000951	7.32%	20%	----
		calcium, total	7440-70-2	E420	0.100	mg/L	347	337	2.67%	20%	----
		cesium, total	7440-46-2	E420	0.000020	mg/L	0.000511	0.000479	6.52%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.0191	0.0186	2.66%	20%	----
		cobalt, total	7440-48-4	E420	0.00020	mg/L	0.0207	0.0208	0.144%	20%	----
		copper, total	7440-50-8	E420	0.00100	mg/L	0.0538	0.0544	1.02%	20%	----
		iron, total	7439-89-6	E420	0.020	mg/L	13.4	13.4	0.0968%	20%	----
		lead, total	7439-92-1	E420	0.000100	mg/L	0.0134	0.0134	0.0674%	20%	----
		lithium, total	7439-93-2	E420	0.0020	mg/L	0.0124	0.0123	0.0001	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0100	mg/L	192	190	1.21%	20%	----
		manganese, total	7439-96-5	E420	0.00020	mg/L	9.10	9.13	0.334%	20%	----
		nickel, total	7440-02-0	E420	0.00100	mg/L	0.161	0.160	0.597%	20%	----
		phosphorus, total	7723-14-0	E420	0.100	mg/L	0.339	0.380	0.041	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	20.1	19.3	4.04%	20%	----
		rubidium, total	7440-17-7	E420	0.00040	mg/L	0.00868	0.00865	0.331%	20%	----
		selenium, total	7782-49-2	E420	0.000100	mg/L	0.000381	0.000448	0.000067	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.20	mg/L	35.0	34.9	0.108%	20%	----
		sodium, total	7440-23-5	E420	0.100	mg/L	351	352	0.146%	20%	----
		strontium, total	7440-24-6	E420	0.00040	mg/L	3.77	3.77	0.0978%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 734523) - continued											
VA22C6911-001	OW1	sulfur, total	7704-34-9	E420	1.00	mg/L	3.25	3.11	0.14	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000020	mg/L	0.000083	0.000088	0.000005	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00020	mg/L	0.00067	0.00066	0.00001	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00020	mg/L	0.00173	0.00167	0.00006	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00060	mg/L	0.299	0.292	2.26%	20%	----
		tungsten, total	7440-33-7	E420	0.00020	mg/L	0.00054	0.00056	0.00003	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000020	mg/L	0.00954	0.00946	0.816%	20%	----
		vanadium, total	7440-62-2	E420	0.00100	mg/L	0.0279	0.0275	1.37%	20%	----
		zinc, total	7440-66-6	E420	0.0060	mg/L	0.0976	0.0956	2.08%	20%	----
		zirconium, total	7440-67-7	E420	0.00040	mg/L	0.0128	0.0126	1.72%	20%	----
Total Metals (QC Lot: 739890)											
FJ2203169-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 733510)											
VA22C6870-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 738712)											
VA22C6911-001	OW1	aluminum, dissolved	7429-90-5	E421	0.0020	mg/L	0.0053	0.0052	0.00008	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00020	mg/L	0.00029	0.00027	0.00002	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00020	mg/L	0.00369	0.00356	3.63%	20%	----
		barium, dissolved	7440-39-3	E421	0.00020	mg/L	1.42	1.43	0.555%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.020	mg/L	1.09	1.13	3.10%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000100	mg/L	0.000132	0.000144	8.02%	20%	----
		calcium, dissolved	7440-70-2	E421	0.100	mg/L	305	306	0.464%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	0.00196	0.00176	0.00020	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00020	mg/L	0.0143	0.0142	1.13%	20%	----
		copper, dissolved	7440-50-8	E421	0.00040	mg/L	0.00402	0.00393	0.00009	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.020	mg/L	4.28	4.18	2.52%	20%	----
		lead, dissolved	7439-92-1	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0020	mg/L	0.0073	0.0072	0.00009	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0100	mg/L	176	174	1.48%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00020	mg/L	8.47	8.39	0.992%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 738712) - continued											
VA22C6911-001	OW1	molybdenum, dissolved	7439-98-7	E421	0.000100	mg/L	0.00396	0.00386	2.49%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00100	mg/L	0.127	0.124	2.39%	20%	----
		phosphorus, dissolved	7723-14-0	E421	0.100	mg/L	0.108	0.105	0.003	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.100	mg/L	16.6	16.6	0.0101%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00040	mg/L	0.00370	0.00361	0.00009	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000100	mg/L	0.000206	0.000220	0.000013	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.100	mg/L	19.5	19.5	0.0623%	20%	----
		silver, dissolved	7440-22-4	E421	0.000020	mg/L	<0.000020	0.000021	0.0000008	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.100	mg/L	331	323	2.63%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00040	mg/L	3.42	3.42	0.0419%	20%	----
		sulfur, dissolved	7704-34-9	E421	1.00	mg/L	2.16	2.18	0.02	Diff <2x LOR	----
		tellurium, dissolved	13494-80-9	E421	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00020	mg/L	0.00049	0.00049	0.0000007	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00060	mg/L	0.00167	0.00177	0.00009	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00020	mg/L	0.00033	0.00032	0.00001	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000020	mg/L	0.00814	0.00812	0.142%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00100	mg/L	0.00312	0.00303	0.00009	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0020	mg/L	0.0021	0.0020	0.0001	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00040	mg/L	0.00702	0.00694	1.05%	20%	----
Aggregate Organics (QC Lot: 741386)											
VA22C6788-001	Anonymous	chemical oxygen demand [COD]	----	E559-L	10	mg/L	24	22	2	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 741741)											
CG2215527-001	Anonymous	benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 741743)											
CG2215573-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	33200	31100	6.67%	30%	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 731928)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 731929)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 731955)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 731956)						
conductivity	----	E100	1	µS/cm	1.2	----
Physical Tests (QCLot: 732062)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 732675)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 732676)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 731957)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 731958)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 731959)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 731960)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 731961)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 731962)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 734388)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 734387)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 734474)						
carbon, total inorganic [TIC]	----	E354-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 734523)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 734523) - continued						
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 739890)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 733510)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 738712)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 738712) - continued						
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 741386)						
chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Volatile Organic Compounds (QCLot: 741741)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 741743)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 743126)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 743897)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 743127)						
acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 743898)						
acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 743898) - continued						
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 731928)									
turbidity	----	E121	0.1	NTU	200 NTU	100	85.0	115	----
Physical Tests (QCLot: 731929)									
turbidity	----	E121	0.1	NTU	200 NTU	99.5	85.0	115	----
Physical Tests (QCLot: 731954)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 731955)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	98.8	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	103	85.0	115	----
Physical Tests (QCLot: 731956)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.5	90.0	110	----
Physical Tests (QCLot: 732062)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 732675)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	93.9	85.0	115	----
Physical Tests (QCLot: 732676)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	97.5	85.0	115	----
Anions and Nutrients (QCLot: 731957)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 731958)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 731959)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 731960)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 731961)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 731962)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 734388)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.0	85.0	115	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 734387)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	98.1	80.0	120	----
Organic / Inorganic Carbon (QCLot: 734474)									
carbon, total inorganic [TIC]	----	E354-L	0.5	mg/L	8 mg/L	102	80.0	120	----
Total Metals (QCLot: 734523)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	108	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	118	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	112	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	105	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	112	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	98.6	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	110	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	109	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	107	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	108	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	106	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	108	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	112	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	110	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	111	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	103	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	113	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	117	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	113	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	109	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.2	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	114	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	109	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	105	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	112	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 734523) - continued									
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	99.0	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	107	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	101	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	105	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	107	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	110	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	110	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	96.7	80.0	120	----
Total Metals (QCLot: 739890)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	98.6	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
Dissolved Metals (QCLot: 738712)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	97.2	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	106	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	94.4	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	88.3	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	97.6	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	105	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	103	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	100	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	107	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	108	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 738712) - continued									
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	101	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	96.7	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	107	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	# 79.7	80.0	120	MES
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	106	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	104	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	96.3	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	97.9	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	99.1	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.7	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	96.5	80.0	120	----
Aggregate Organics (QCLot: 741386)									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	110	85.0	115	----
Volatile Organic Compounds (QCLot: 741741)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	92.0	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	87.4	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	93.2	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	88.2	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	88.9	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	82.8	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	87.3	70.0	130	----
Hydrocarbons (QCLot: 741743)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	100 µg/L	102	70.0	130	----
Hydrocarbons (QCLot: 743126)									
EPH (C10-C19)	----	E601A	250	µg/L	6638.596 µg/L	96.1	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3614.035 µg/L	95.1	70.0	130	----
Hydrocarbons (QCLot: 743897)									
EPH (C10-C19)	----	E601A	250	µg/L	6638.596 µg/L	102	70.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Hydrocarbons (QCLot: 743897) - continued									
EPH (C19-C32)	----	E601A	250	µg/L	3614.035 µg/L	101	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 743127)									
acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	78.8	60.0	130	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	79.2	60.0	130	----
acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	86.9	60.0	130	----
anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	86.0	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	75.6	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	80.3	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	74.4	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	96.2	60.0	130	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	89.3	60.0	130	----
chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	89.8	60.0	130	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	88.4	60.0	130	----
fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	91.7	60.0	130	----
fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	84.4	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	85.2	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	71.6	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	61.7	60.0	130	----
naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	77.7	50.0	130	----
phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	86.8	60.0	130	----
pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	89.3	60.0	130	----
quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	63.5	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 743898)									
acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	79.4	60.0	130	----
anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	98.6	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	86.7	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	89.1	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	86.8	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	100	60.0	130	----
fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 743898) - continued									
fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	89.3	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	96.8	60.0	130	----
naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	111	50.0	130	----
phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	102	60.0	130	----
pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	95.2	60.0	130	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 731957)										
VA22C6911-001	OW1	fluoride	16984-48-8	E235.F	19.3 mg/L	20 mg/L	96.5	75.0	125	----
Anions and Nutrients (QCLot: 731958)										
VA22C6911-001	OW1	chloride	16887-00-6	E235.Cl	2000 mg/L	2000 mg/L	99.8	75.0	125	----
Anions and Nutrients (QCLot: 731959)										
VA22C6911-001	OW1	bromide	24959-67-9	E235.Br-L	10.5 mg/L	10 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 731960)										
VA22C6911-001	OW1	nitrate (as N)	14797-55-8	E235.NO3-L	51.1 mg/L	50 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 731961)										
VA22C6911-001	OW1	nitrite (as N)	14797-65-0	E235.NO2-L	9.56 mg/L	10 mg/L	95.6	75.0	125	----
Anions and Nutrients (QCLot: 731962)										
VA22C6911-001	OW1	sulfate (as SO4)	14808-79-8	E235.SO4	2030 mg/L	2000 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 734388)										
VA22C6905-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.103 mg/L	0.1 mg/L	103	75.0	125	----
Organic / Inorganic Carbon (QCLot: 734387)										
VA22C6911-002	OW6	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 734474)										
VA22C6911-002	OW6	carbon, total inorganic [TIC]	----	E354-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 734523)										
VA22C6911-002	OW6	aluminum, total	7429-90-5	E420	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		antimony, total	7440-36-0	E420	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		arsenic, total	7440-38-2	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00928 mg/L	0.01 mg/L	92.8	70.0	130	----
		boron, total	7440-42-8	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00393 mg/L	0.004 mg/L	98.3	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0105 mg/L	0.01 mg/L	105	70.0	130	----
		chromium, total	7440-47-3	E420	0.0397 mg/L	0.04 mg/L	99.3	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 734523) - continued										
VA22C6911-002	OW6	cobalt, total	7440-48-4	E420	0.0186 mg/L	0.02 mg/L	93.0	70.0	130	----
		copper, total	7440-50-8	E420	0.0184 mg/L	0.02 mg/L	92.0	70.0	130	----
		iron, total	7439-89-6	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		lead, total	7439-92-1	E420	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		lithium, total	7439-93-2	E420	0.0951 mg/L	0.1 mg/L	95.1	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0211 mg/L	0.02 mg/L	106	70.0	130	----
		nickel, total	7440-02-0	E420	0.0377 mg/L	0.04 mg/L	94.3	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.0 mg/L	10 mg/L	100	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		selenium, total	7782-49-2	E420	0.0414 mg/L	0.04 mg/L	103	70.0	130	----
		silicon, total	7440-21-3	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	22.6 mg/L	20 mg/L	113	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0381 mg/L	0.04 mg/L	95.4	70.0	130	----
		thallium, total	7440-28-0	E420	0.00378 mg/L	0.004 mg/L	94.4	70.0	130	----
		thorium, total	7440-29-1	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		tin, total	7440-31-5	E420	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		titanium, total	7440-32-6	E420	0.0391 mg/L	0.04 mg/L	97.9	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		uranium, total	7440-61-1	E420	0.00392 mg/L	0.004 mg/L	98.1	70.0	130	----
		vanadium, total	7440-62-2	E420	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		zinc, total	7440-66-6	E420	0.358 mg/L	0.4 mg/L	89.4	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0426 mg/L	0.04 mg/L	106	70.0	130	----
Total Metals (QCLot: 739890)										
VA22C6840-002	Anonymous	mercury, total	7439-97-6	E508	0.0000994 mg/L	0.0001 mg/L	99.4	70.0	130	----
Dissolved Metals (QCLot: 733510)										
VA22C6870-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000938 mg/L	0.0001 mg/L	93.8	70.0	130	----
Dissolved Metals (QCLot: 738712)										
VA22C6911-002	OW6	aluminum, dissolved	7429-90-5	E421	0.212 mg/L	0.2 mg/L	106	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 738712) - continued										
VA22C6911-002	OW6	arsenic, dissolved	7440-38-2	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00897 mg/L	0.01 mg/L	89.7	70.0	130	----
		boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00385 mg/L	0.004 mg/L	96.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0102 mg/L	0.01 mg/L	102	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0179 mg/L	0.02 mg/L	89.7	70.0	130	----
		iron, dissolved	7439-89-6	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0181 mg/L	0.02 mg/L	90.4	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0368 mg/L	0.04 mg/L	91.9	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	11.0 mg/L	10 mg/L	110	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		silicon, dissolved	7440-21-3	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00263 mg/L	0.004 mg/L	65.6	70.0	130	MES
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	23.1 mg/L	20 mg/L	115	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0368 mg/L	0.04 mg/L	92.1	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00369 mg/L	0.004 mg/L	92.2	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00383 mg/L	0.004 mg/L	95.8	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.106 mg/L	0.1 mg/L	106	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 738712) - continued										
VA22C6911-002	OW6	zinc, dissolved	7440-66-6	E421	0.376 mg/L	0.4 mg/L	94.0	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0416 mg/L	0.04 mg/L	104	70.0	130	----
Aggregate Organics (QCLot: 741386)										
VA22C6788-002	Anonymous	chemical oxygen demand [COD]	----	E559-L	103 mg/L	100 mg/L	103	75.0	125	----
Volatile Organic Compounds (QCLot: 741741)										
CG2215527-001	Anonymous	benzene	71-43-2	E611A	93.2 µg/L	100 µg/L	93.2	70.0	130	----
		ethylbenzene	100-41-4	E611A	78.2 µg/L	100 µg/L	78.2	70.0	130	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	94.8 µg/L	100 µg/L	94.8	70.0	130	----
		styrene	100-42-5	E611A	87.7 µg/L	100 µg/L	87.7	70.0	130	----
		toluene	108-88-3	E611A	88.8 µg/L	100 µg/L	88.8	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	167 µg/L	200 µg/L	83.6	70.0	130	----
		xylene, o-	95-47-6	E611A	82.8 µg/L	100 µg/L	82.8	70.0	130	----

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Environmental Division Vancouver
Work Order Reference
VA22C6911

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	WSP ESL - CANADA LIMITED
Contact:	MAYLEE EISBRENNER
Phone:	250-960-9845
	Company address below will appear on the final report
Street:	3456 OPIE CRES.
City/Province:	PRINCE GEORGE / BC
Postal Code:	V2N 2P9

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

Invoice To		
	Same as Report To	YES NO
	Copy of Invoice with Report	YES NO
Company:		
Contact:		

Invoice Distribution	
Select Invoice Distribution:	EMAIL MAIL FAX
Email 1 or Fax	
Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA21-WOOD100-015	AFE/Cost Center:	PO#
Job #:	KX05593.3	Major/Minor Code:	Routing Code:
PO / AFE:	KX05593.3.****.1110.573000	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Selam

Sampler: Maylee

Select Service Level Below - Contact your AM

Regular [R] Standard TAT if received by 3

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

EMERGENCY: 1 Busine... Same Da... (Laborat...

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selec...

Analysis

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Chemistry (P)	Total Sulphur (P)	Ammonia (P)	LEPH/HEPH/PAH (P)	BTEX/VPH (P)	TOC (P)	TIC	COD (P)	Dissolved Metals (F/P)	Total Metals (P)	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	OW1	02-NOV-22		WATER	X	X	X	X		X	X	X	X				
	OW6							X									
	MW05-8S							X									
	MW08-8D																
	MW11-13D																
	MW11-14								X				↓				
	CP													X			
	PM													X			
	DUP2	↓						X	X				X				
	OW7	03-NOV-22											X				
	MW11-13S												X				
	SF	↓		↓	↓	↓	↓			↓	↓	↓		X			

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? YES NO	Gen Chem: Conductivity, hardness, pH, TDS, turbidity, alkalinity (bicarbonate, carbonate, hydroxide, total), bromide, chloride, fluoride, nitrate, nitrite, sulphate, total calcium, total iron, total magnesium, total manganese, total potassium, total sodium.
Are samples for human consumption/ use? YES NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen | SIF Observations: Yes / No

Ice Packs | Ice Cubes | Custody seal intact: Yes / No

Cooling Initiated

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				3	3	5	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: 3 NOV 2022	Time: 16:30	Received by:	Date:	Time:	Received by: JC	Date: 4 Nov 22	Time: 9 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

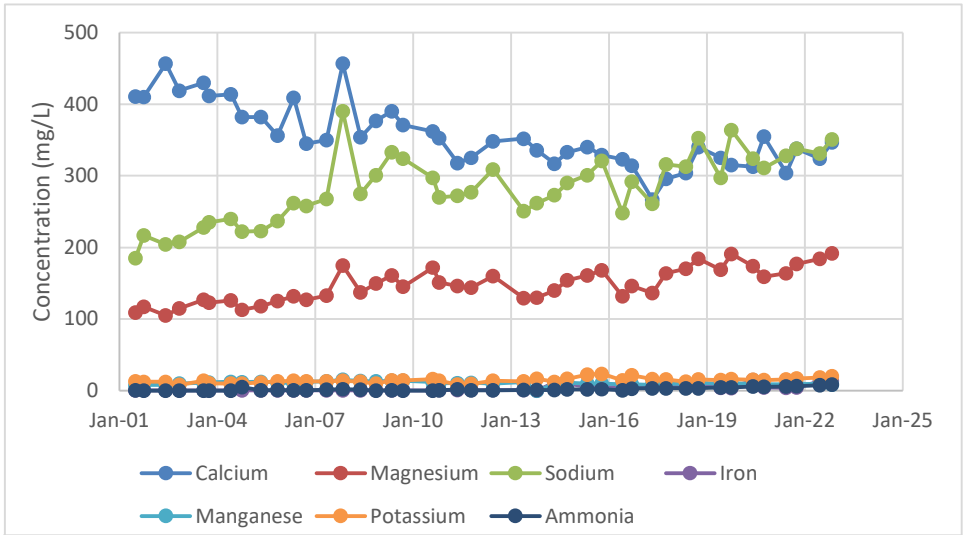
JULY 2017 FRONT

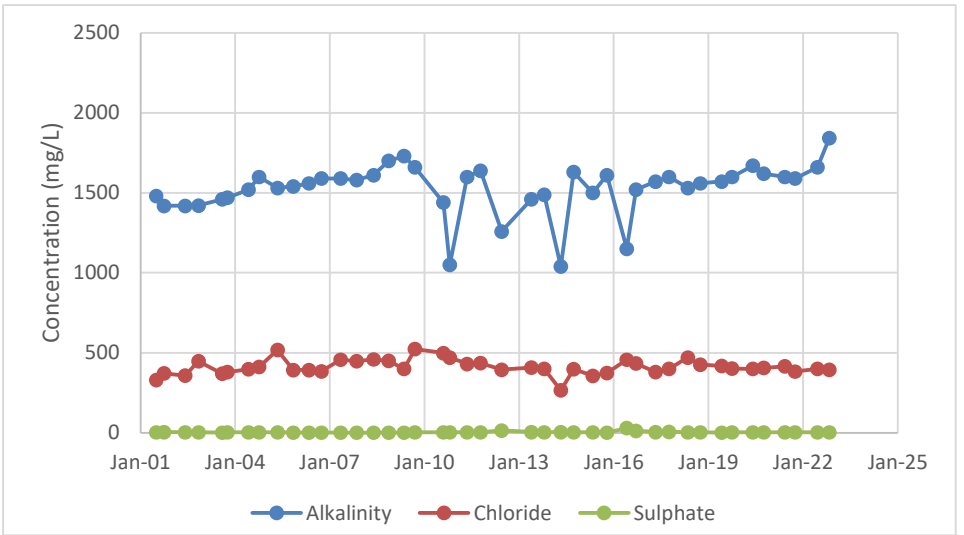
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

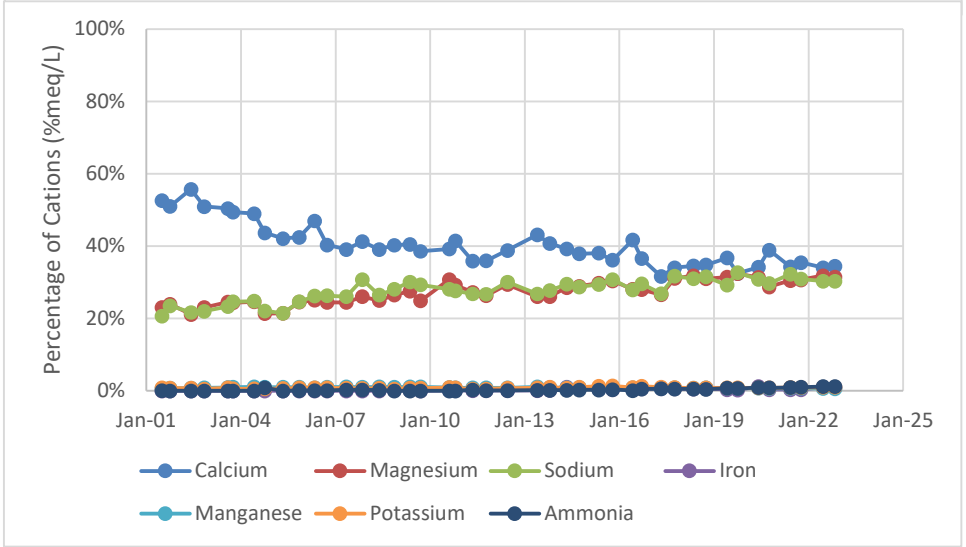
1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

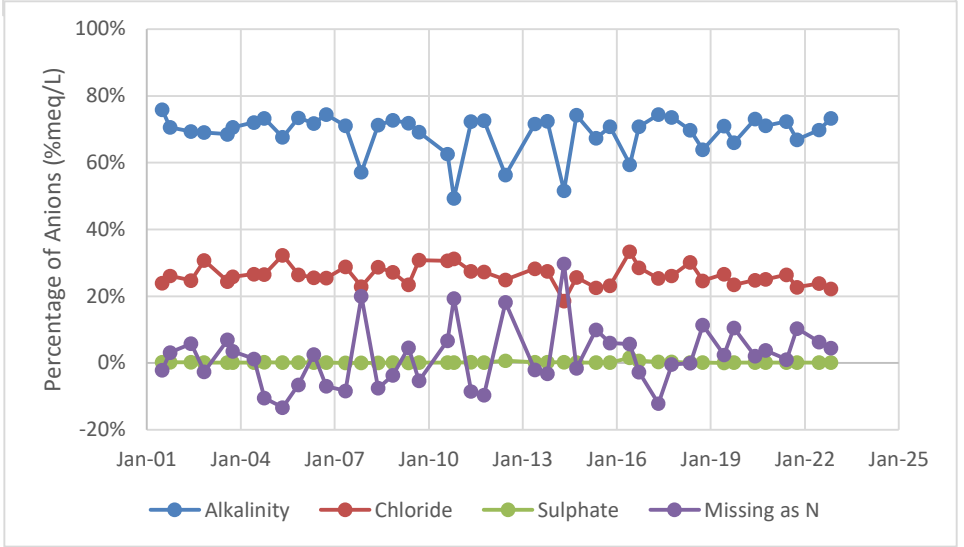
Appendix H

Ion Percentage Graphs

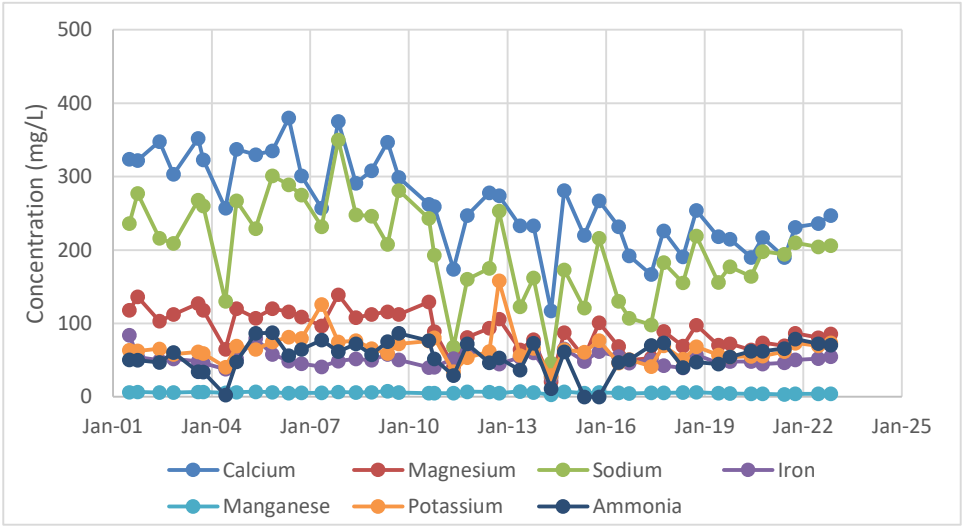

Concentration (mg/L)
500
400
300
200
100
0
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium
Ammonia

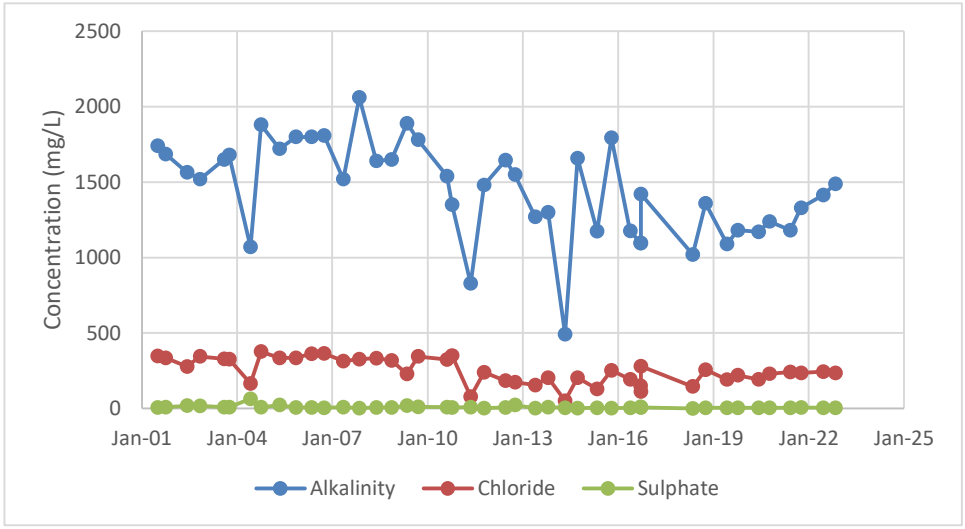

Concentration (mg/L)
2500
2000
1500
1000
500
0
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate

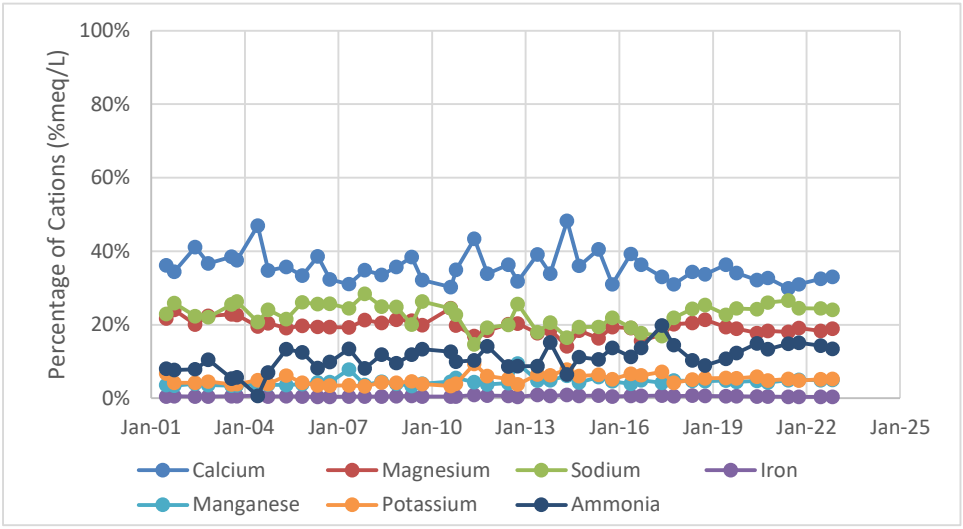

Percentage of Cations (%meq/L)
100%
80%
60%
40%
20%
0%
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium
Ammonia

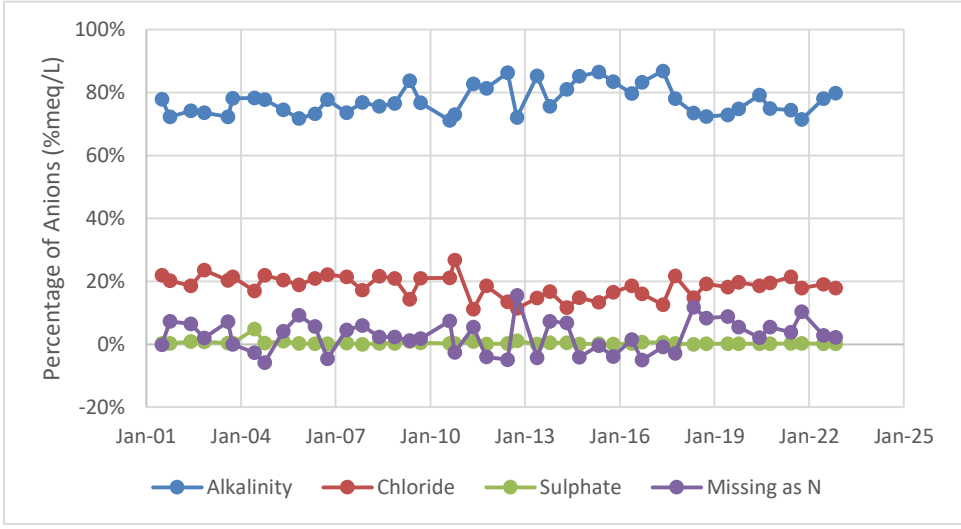

Percentage of Anions (%meq/L)
100%
80%
60%
40%
20%
0%
-20%
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Missing as N

OW-1

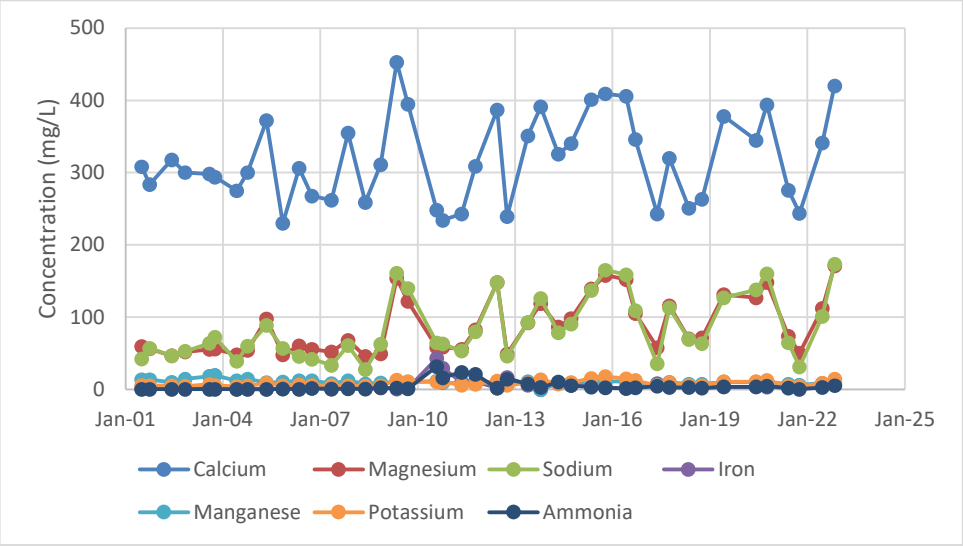

Concentration (mg/L)
500
400
300
200
100
0
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium
Ammonia

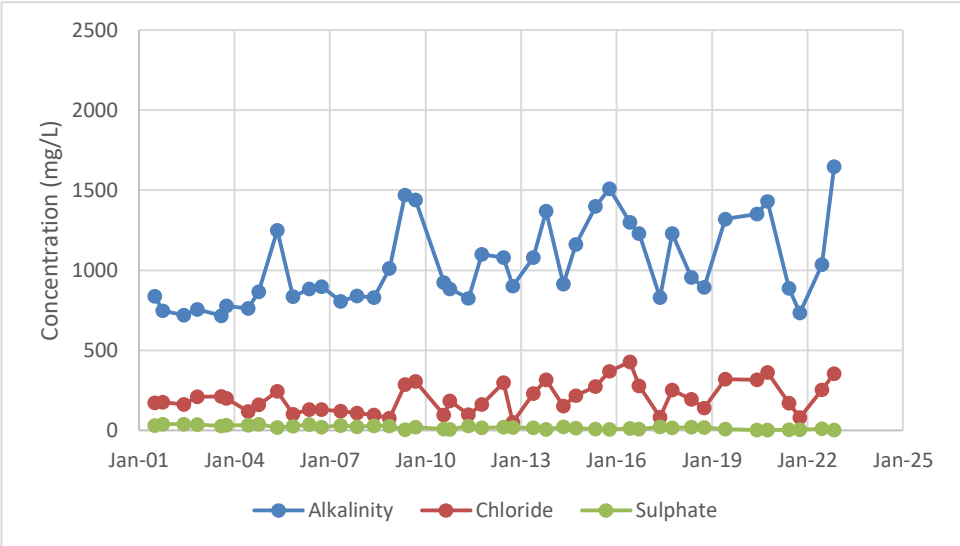

Concentration (mg/L)
2500
2000
1500
1000
500
0
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate

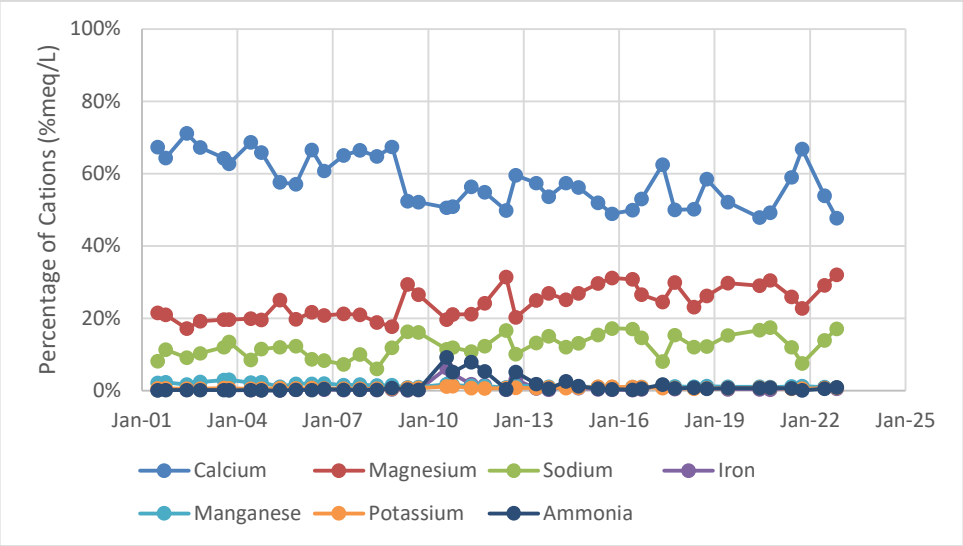

Percentage of Cations (%meq/L)
100%
80%
60%
40%
20%
0%
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium
Ammonia

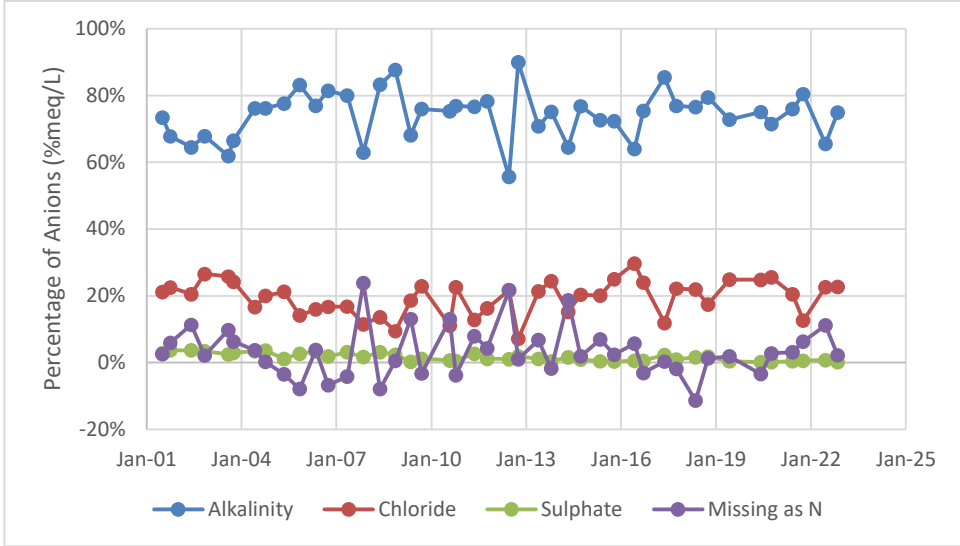

Percentage of Anions (%meq/L)
100%
80%
60%
40%
20%
0%
-20%
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Missing as N

OW-6

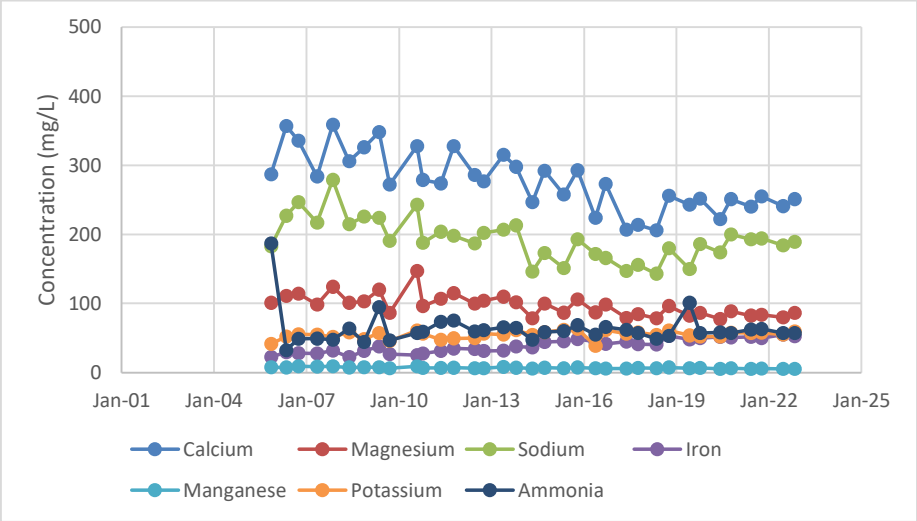

Concentration (mg/L)
500
400
300
200
100
0
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium
Ammonia

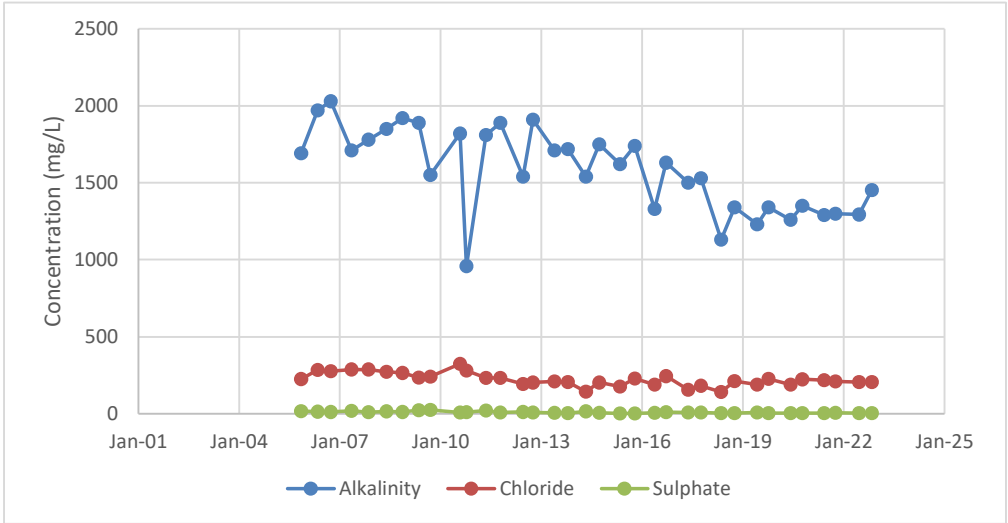

Concentration (mg/L)
2500
2000
1500
1000
500
0
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate

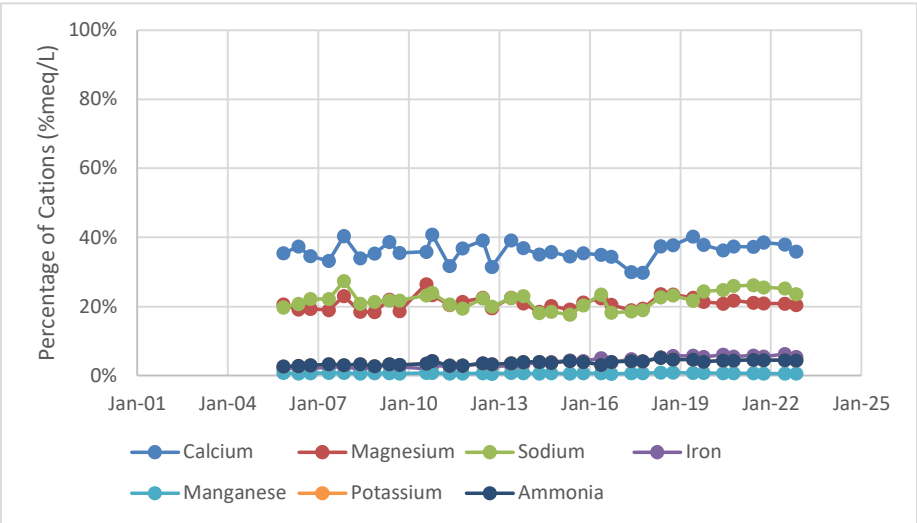

Percentage of Cations (%meq/L)
100%
80%
60%
40%
20%
0%
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium
Ammonia

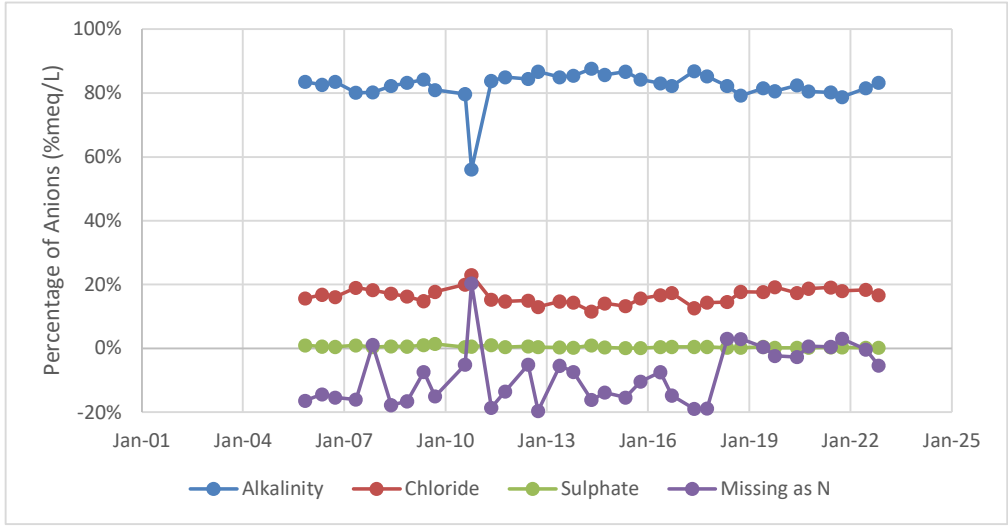

Percentage of Anions (%meq/L)
100%
80%
60%
40%
20%
0%
-20%
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Missing as N

OW-7

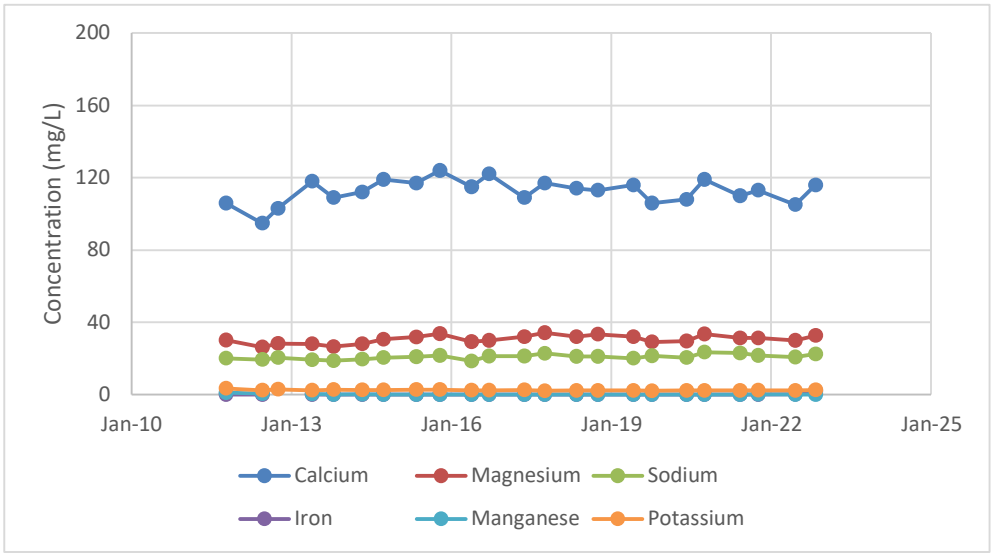

Concentration (mg/L)
500
400
300
200
100
0
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium
Ammonia

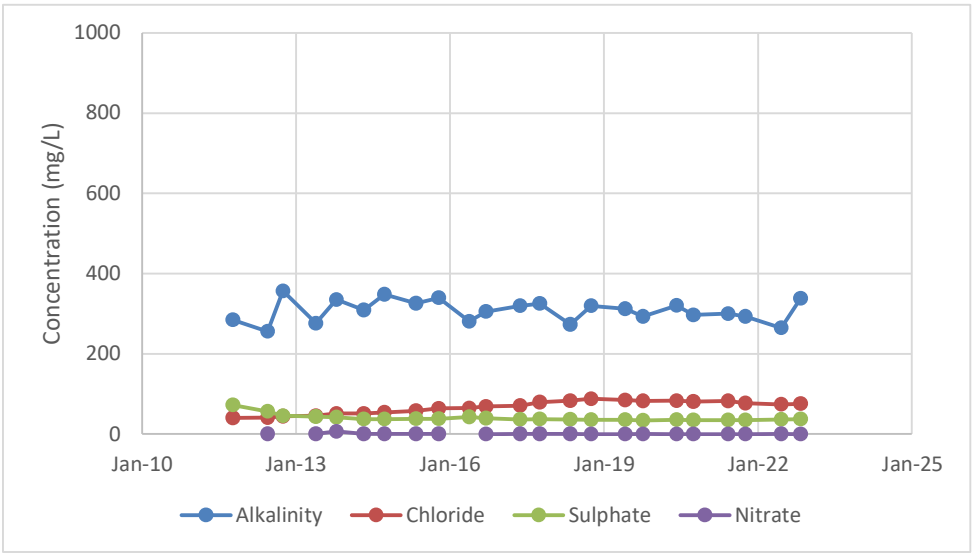

Concentration (mg/L)
2500
2000
1500
1000
500
0
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate

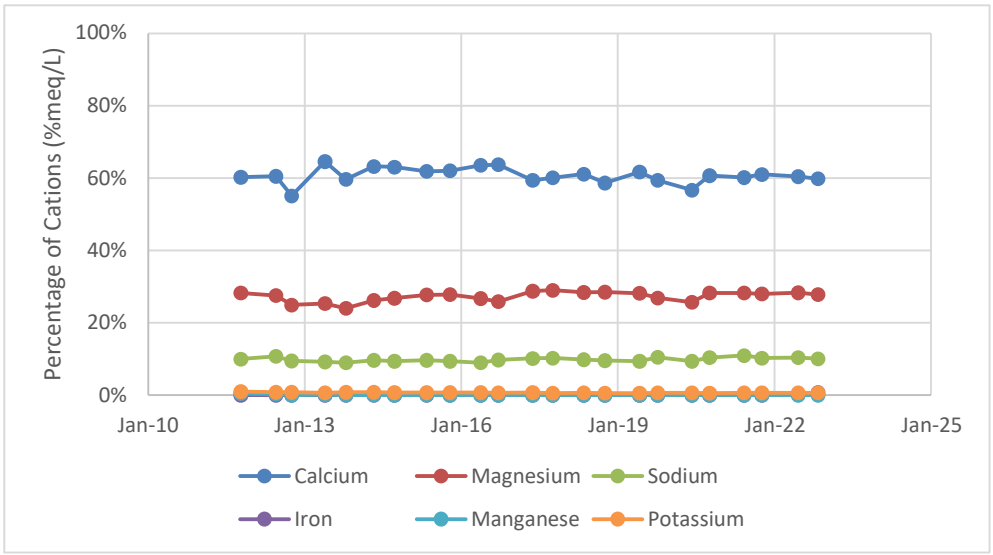

Percentage of Cations (%meq/L)
100%
80%
60%
40%
20%
0%
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium
Ammonia

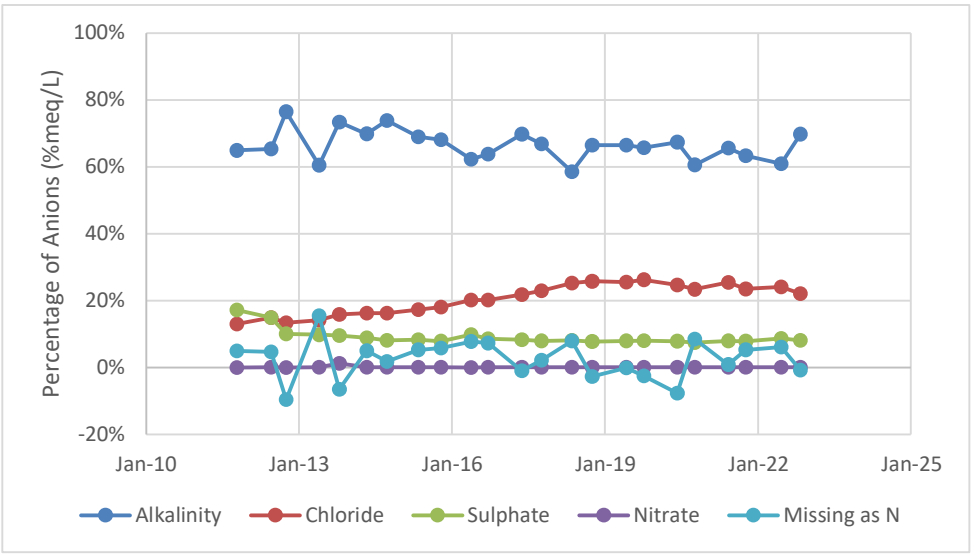

Percentage of Anions (%meq/L)
100%
80%
60%
40%
20%
0%
-20%
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Missing as N

MW05-8S

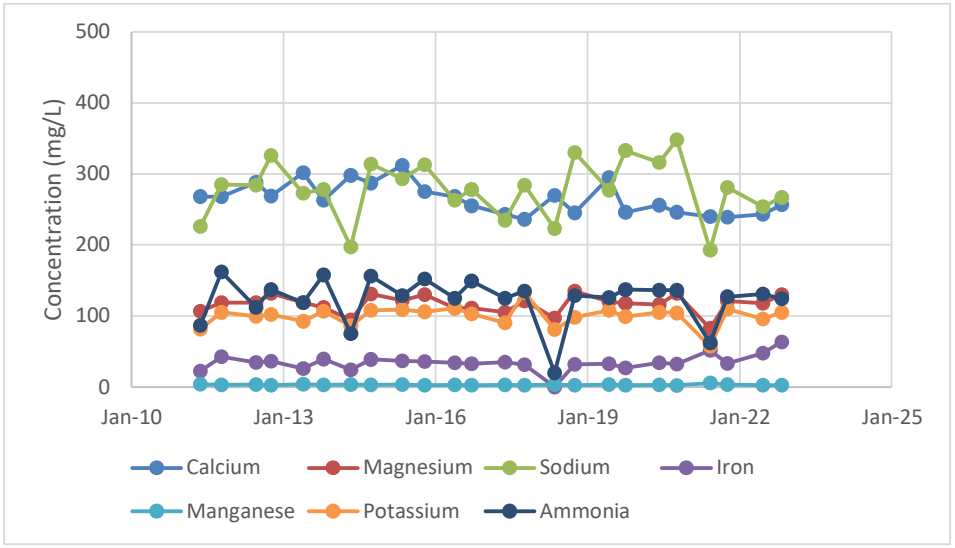

Concentration (mg/L)
200
160
120
80
40
0
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium

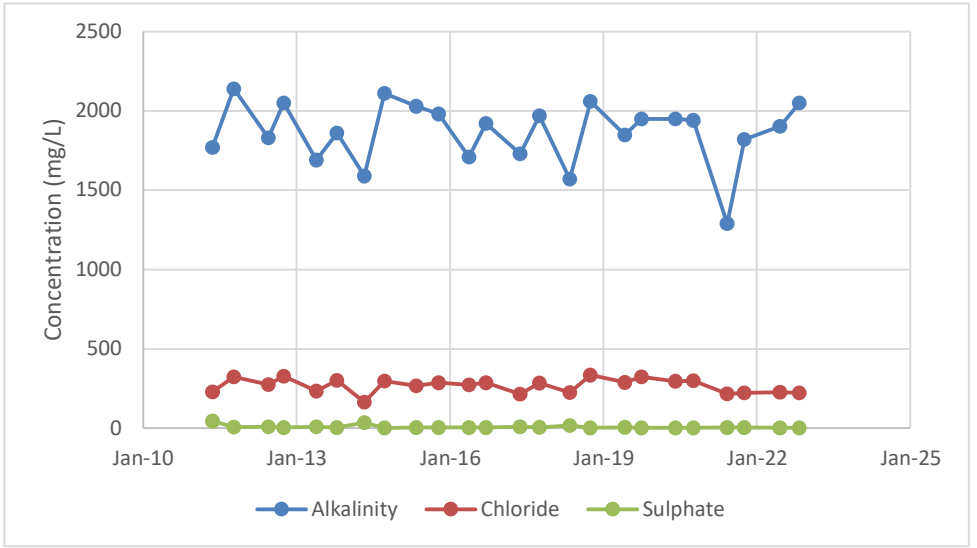

Concentration (mg/L)
1000
800
600
400
200
0
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Nitrate

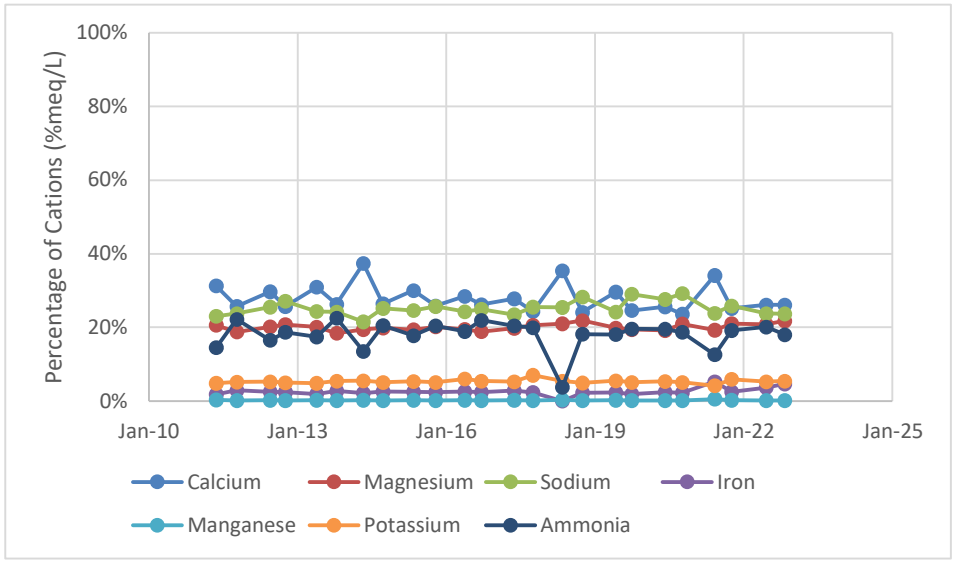

Percentage of Cations (%meq/L)
100%
80%
60%
40%
20%
0%
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium

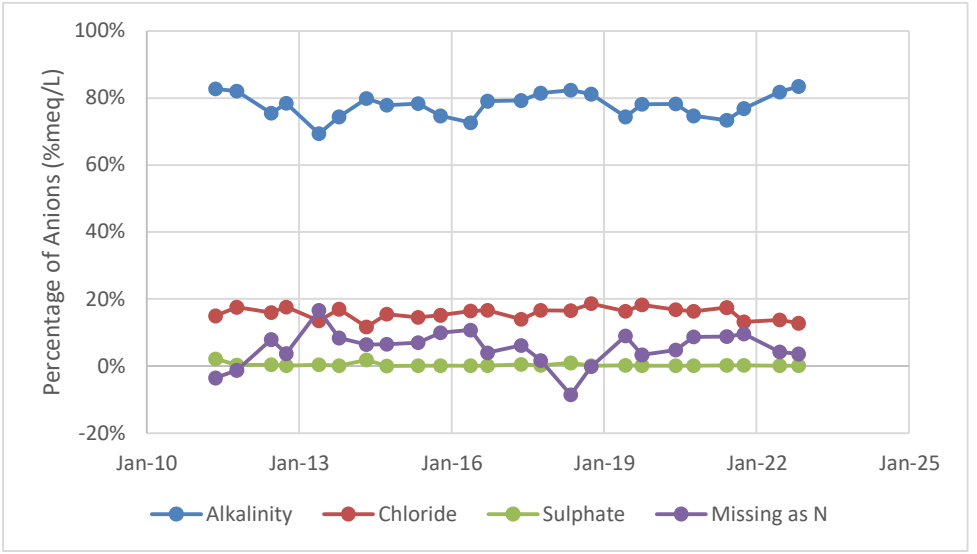

Percentage of Anions (%meq/L)
100%
80%
60%
40%
20%
0%
-20%
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Nitrate
Missing as N

MW11-13S

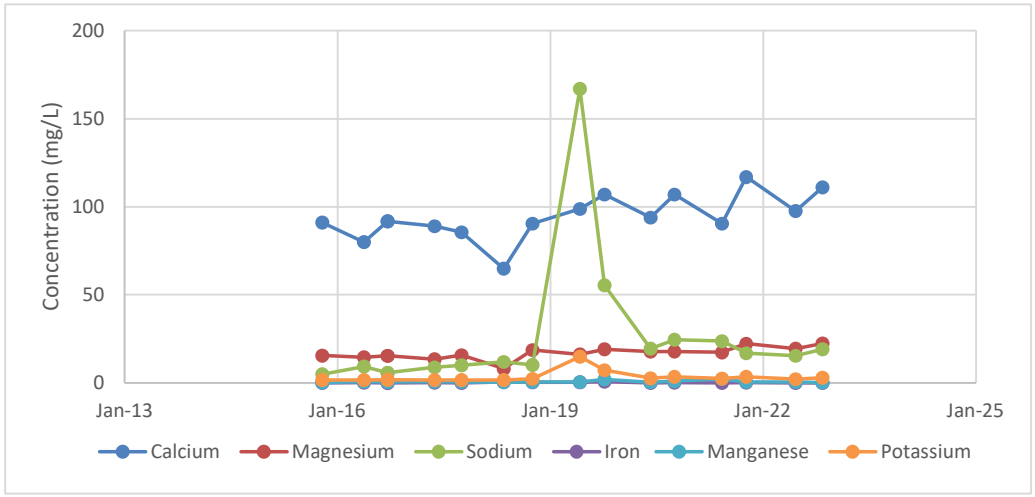

Concentration (mg/L)
500
400
300
200
100
0
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium
Ammonia

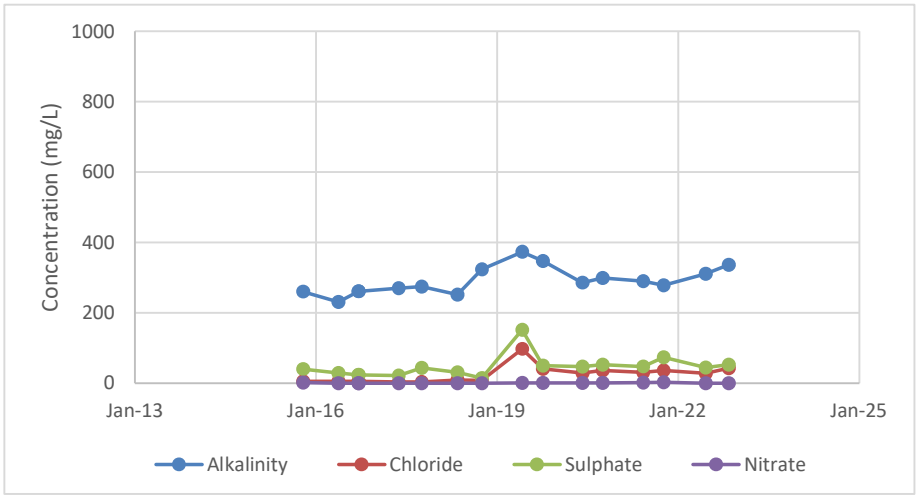

Concentration (mg/L)
2500
2000
1500
1000
500
0
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate

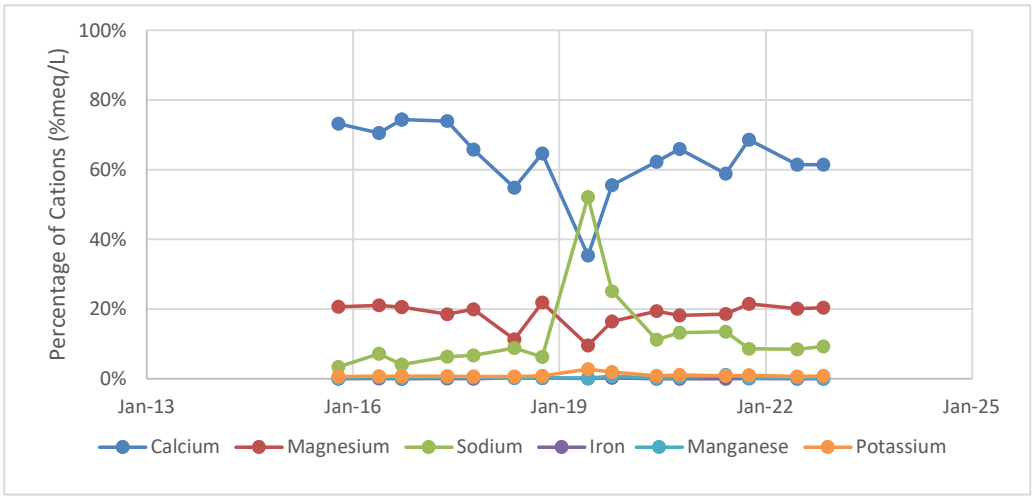

Percentage of Cations (%meq/L)
100%
80%
60%
40%
20%
0%
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium
Ammonia

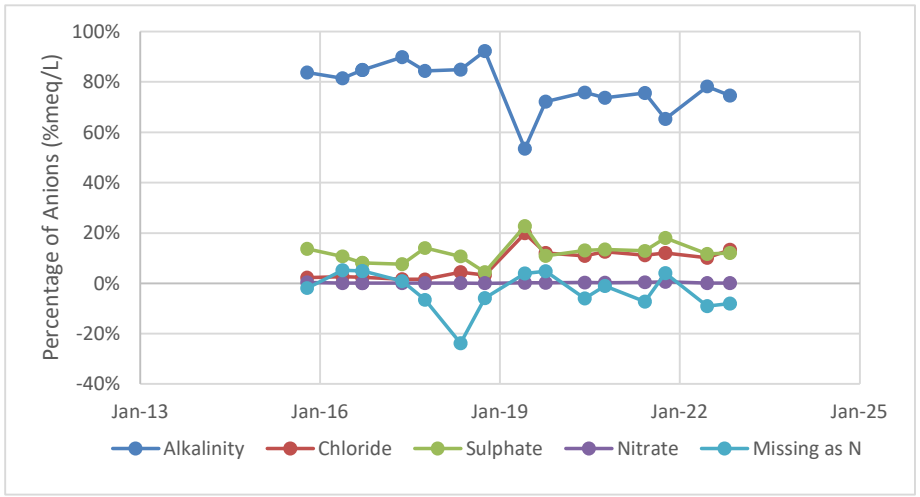

Percentage of Anions (%meq/L)
100%
80%
60%
40%
20%
0%
-20%
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Missing as N

MW11-14

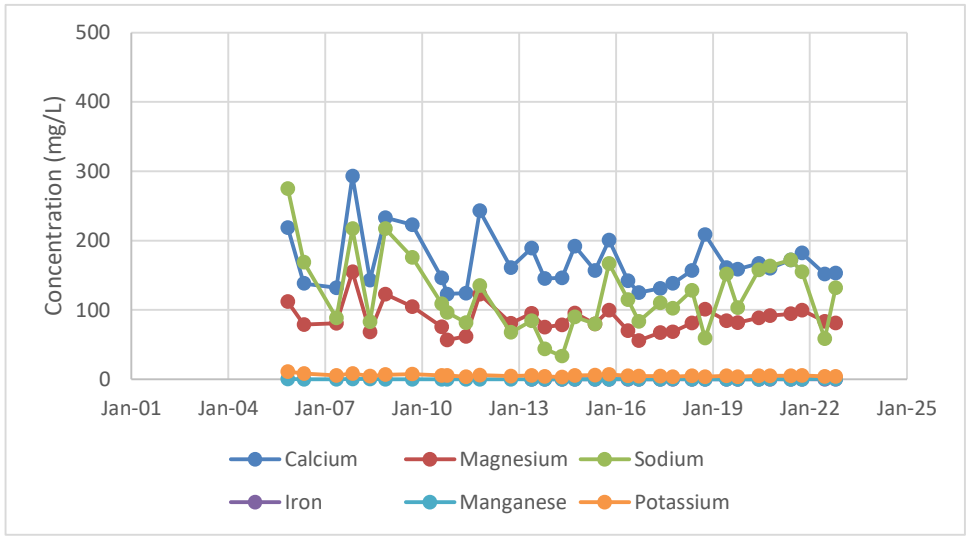

200
150
100
50
0
Concentration (mg/L)
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium

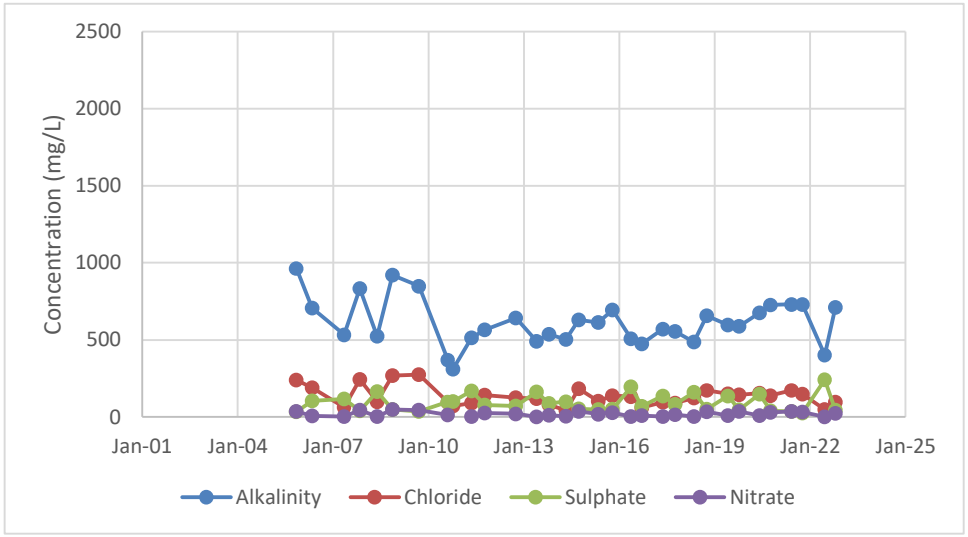

1000
800
600
400
200
0
Concentration (mg/L)
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Nitrate

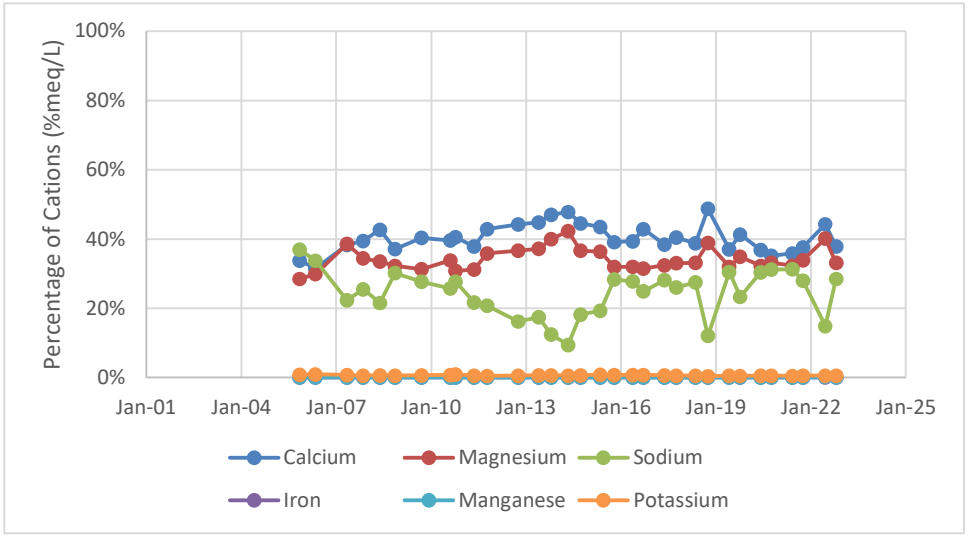

100%
80%
60%
40%
20%
0%
Percentage of Cations (%meq/L)
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium

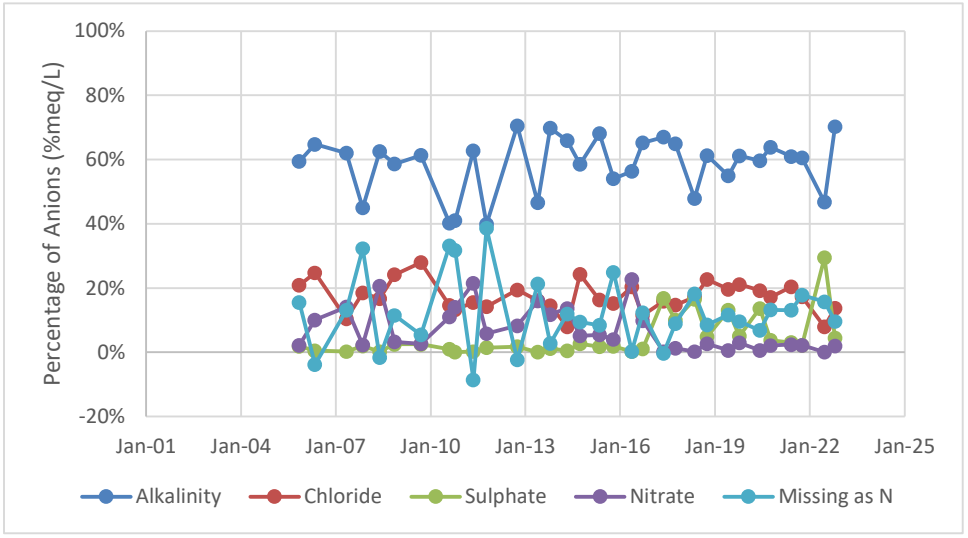

100%
80%
60%
40%
20%
0%
-20%
-40%
Percentage of Anions (%meq/L)
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Nitrate
Missing as N

PM

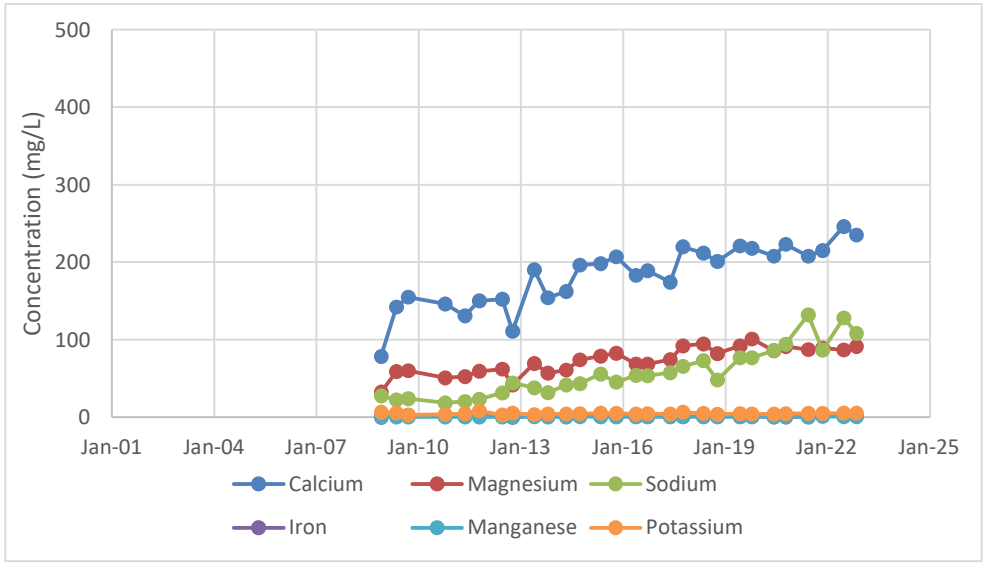

500
400
300
200
100
0
Concentration (mg/L)
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium

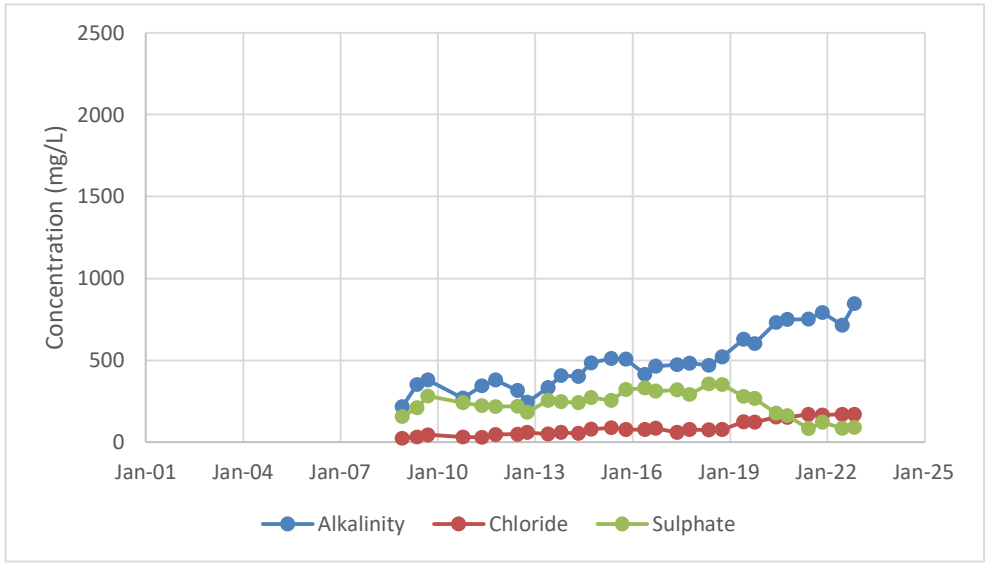

2500
2000
1500
1000
500
0
Concentration (mg/L)
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Nitrate

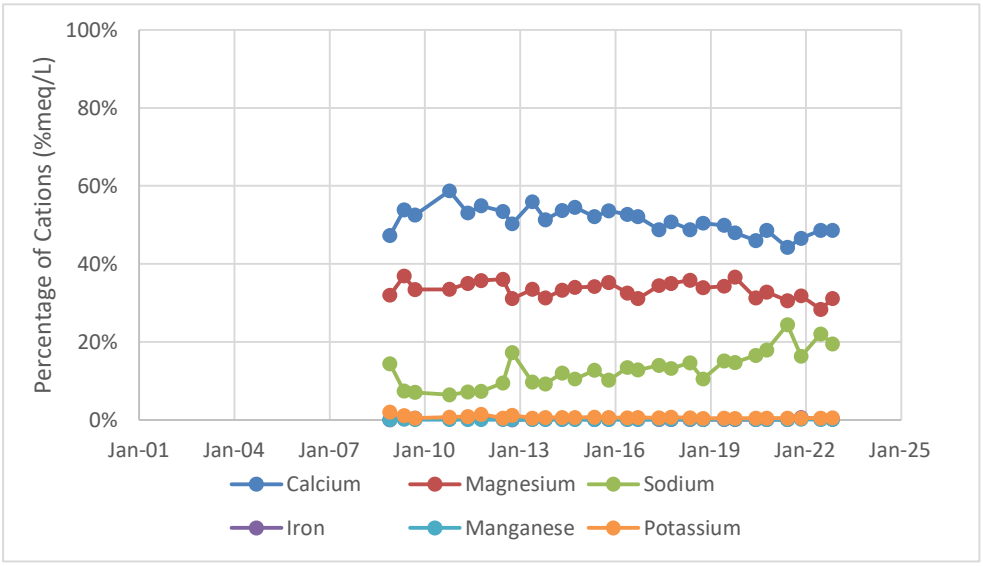

100%
80%
60%
40%
20%
0%
Percentage of Cations (%meq/L)
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium

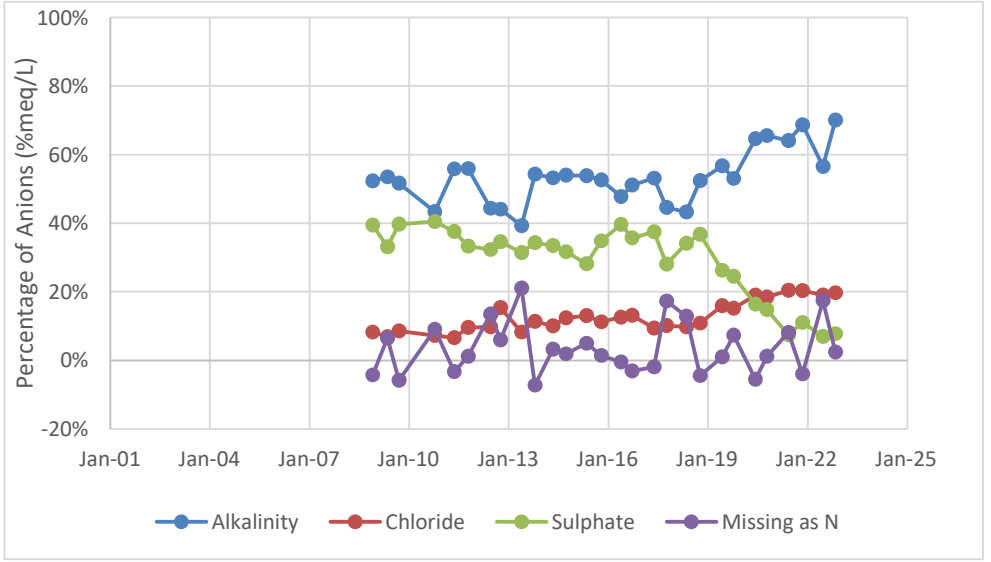

100%
80%
60%
40%
20%
0%
-20%
Percentage of Anions (%meq/L)
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Nitrate
Missing as N

MW05-10

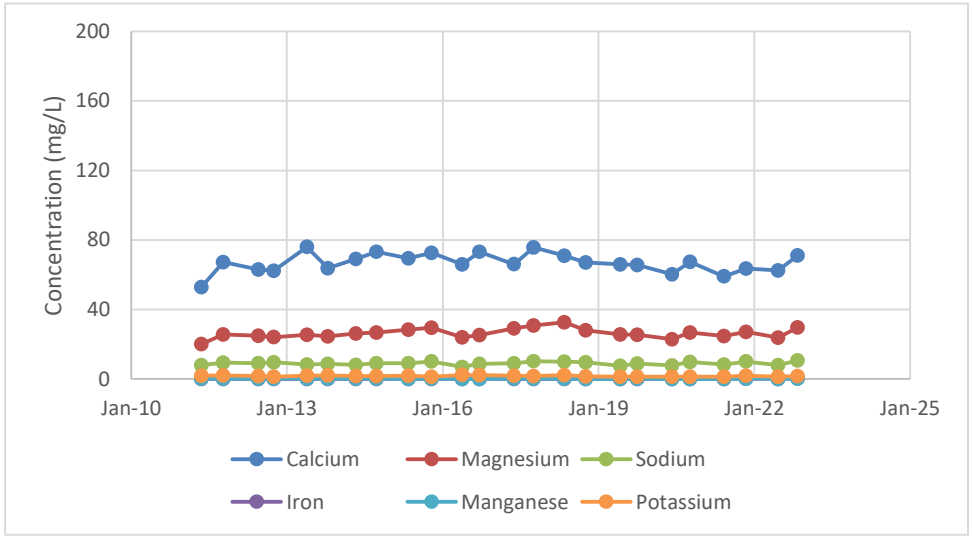

Concentration (mg/L)
500
400
300
200
100
0
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium


Concentration (mg/L)
2500
2000
1500
1000
500
0
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate


Percentage of Cations (%meq/L)
100%
80%
60%
40%
20%
0%
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium


Percentage of Anions (%meq/L)
100%
80%
60%
40%
20%
0%
-20%
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Missing as N

MW08-8D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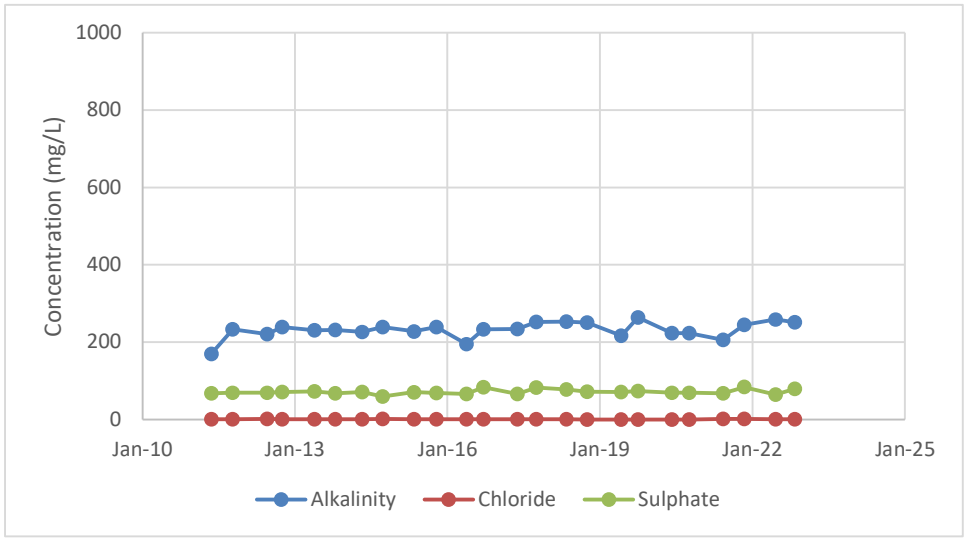
160
120
80
40
0
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium


Concentration (mg/L)
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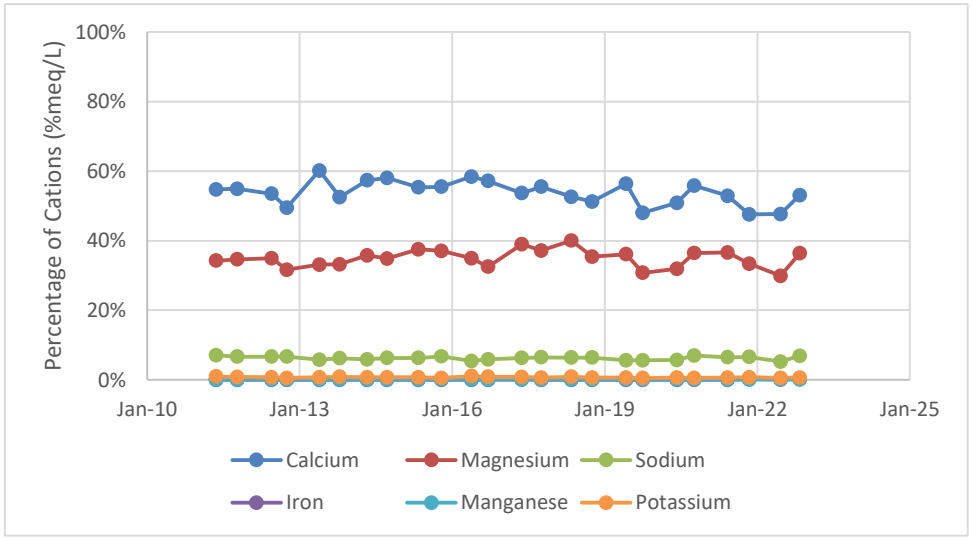
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate


Percentage of Cations (%meq/L)
100%
80%
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40%
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Jan-13
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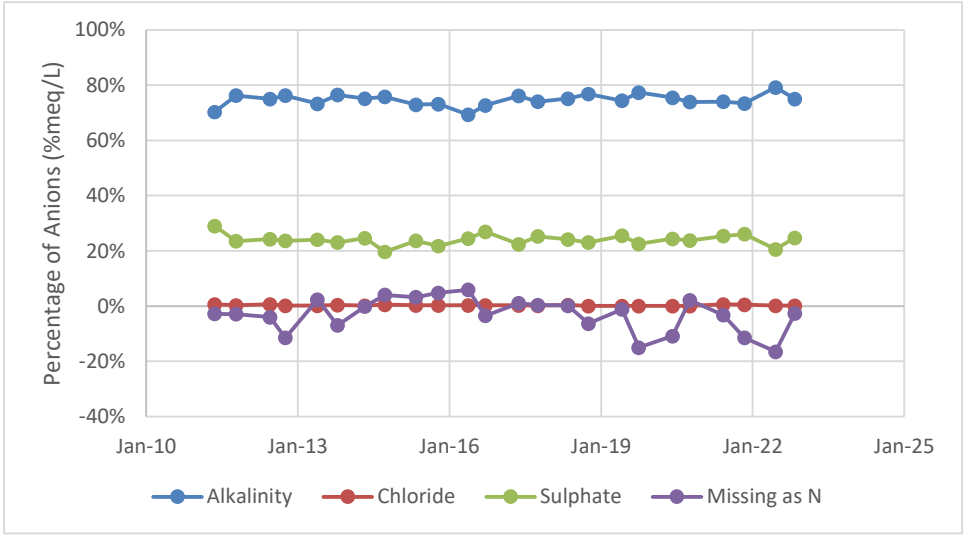
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium


Percentage of Anions (%meq/L)
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40%
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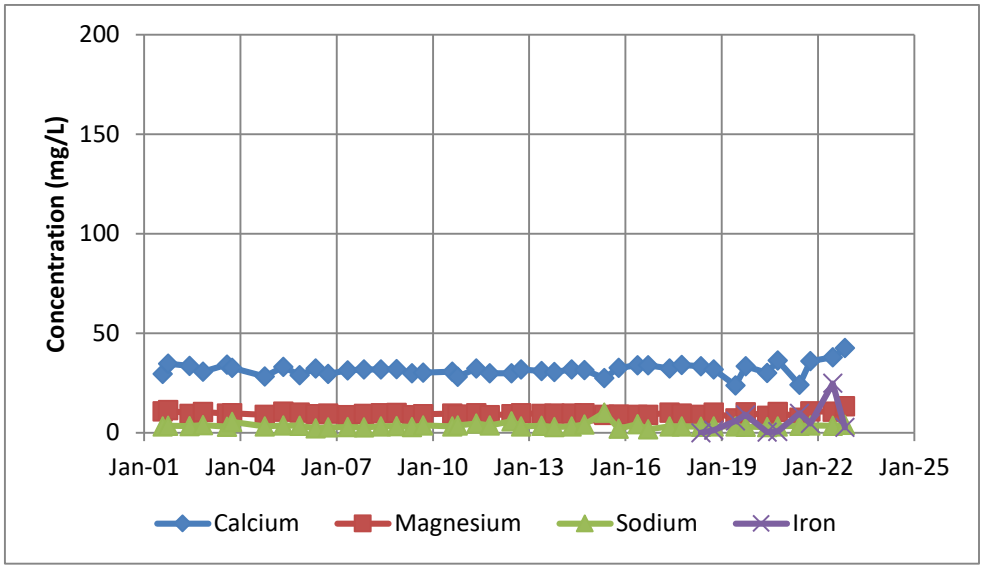
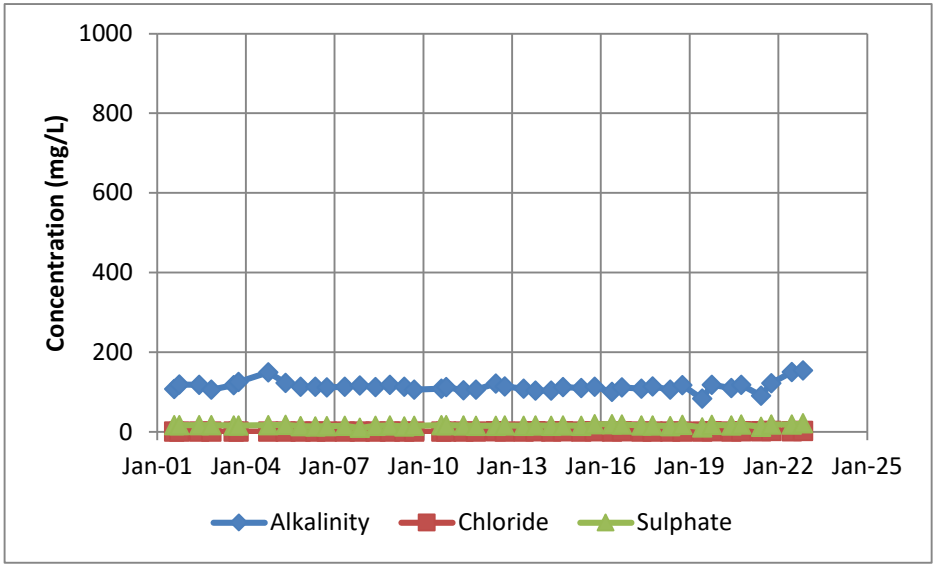
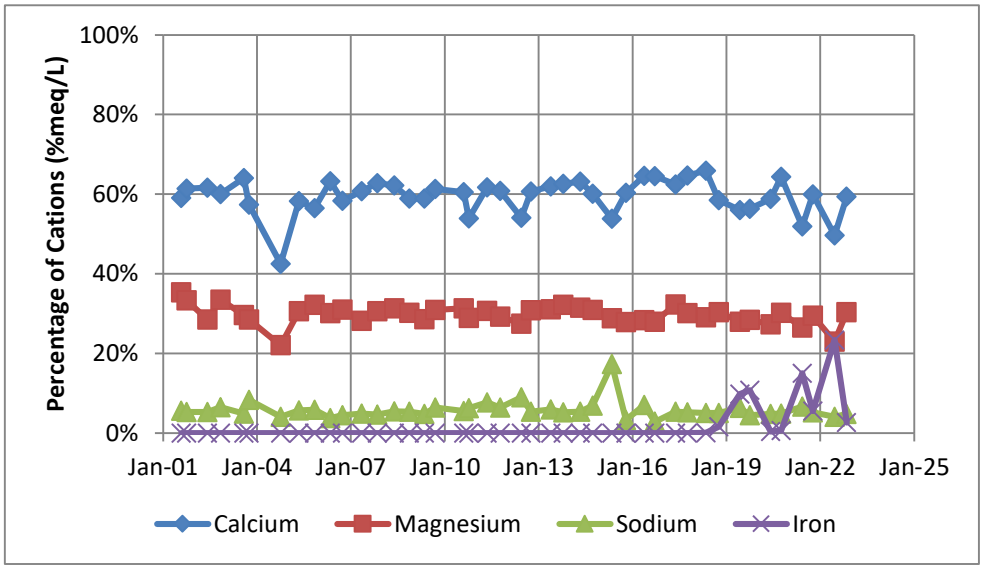
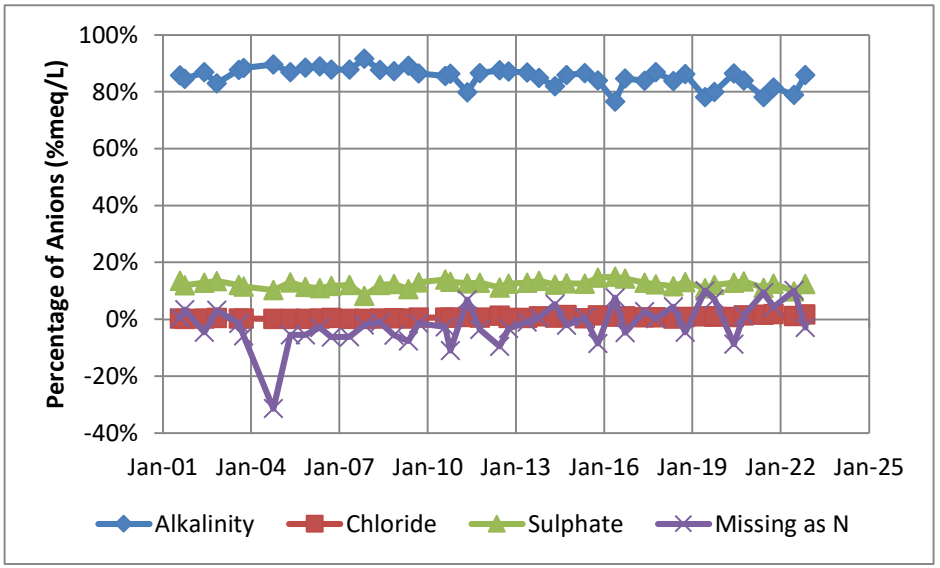
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate
Missing as N

MW11-13D

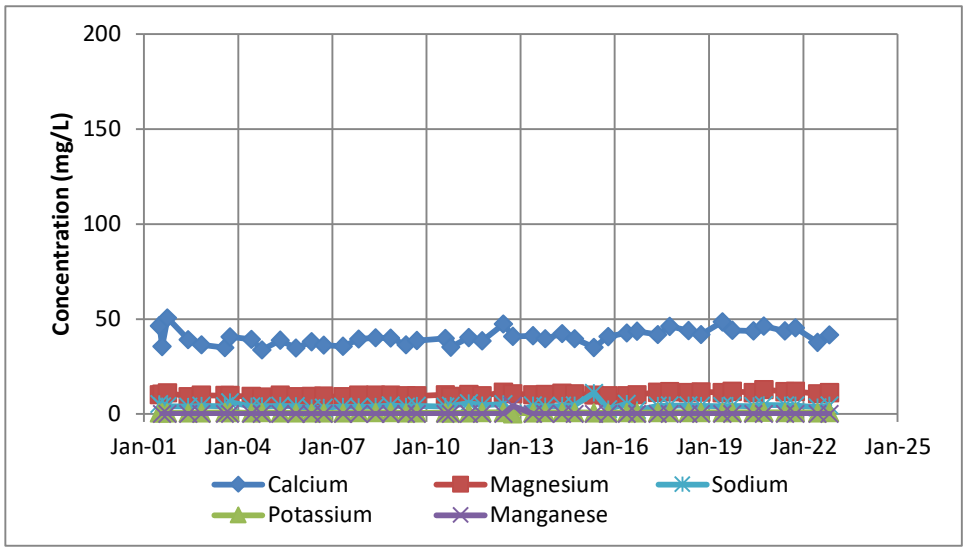


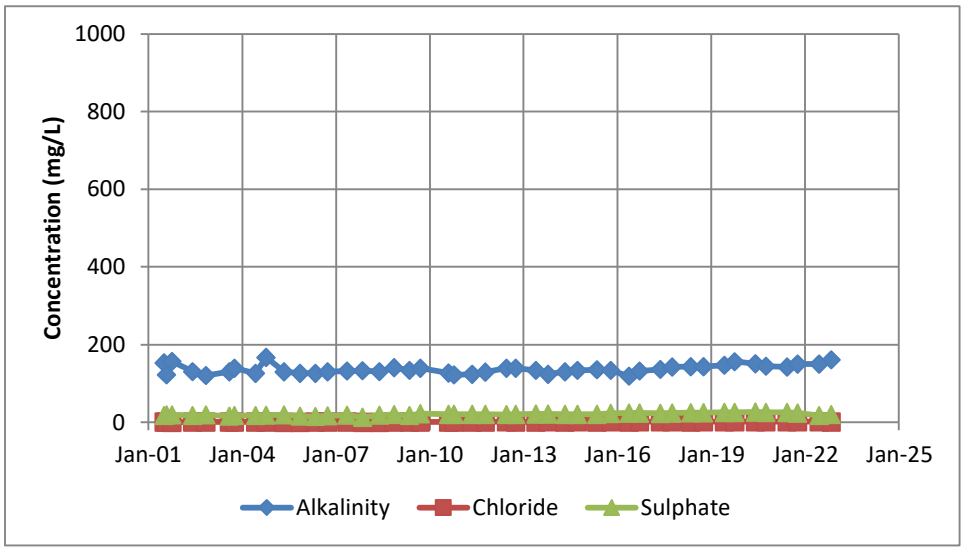


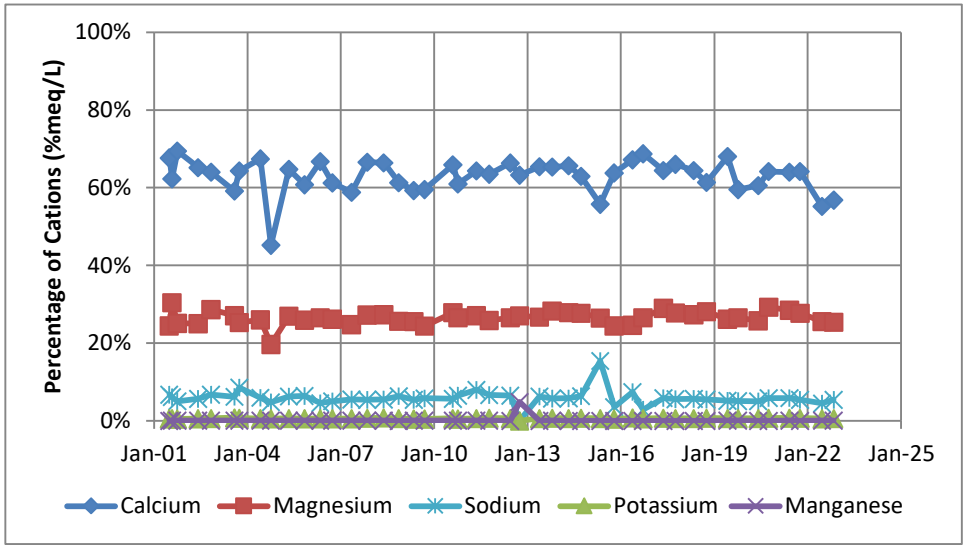


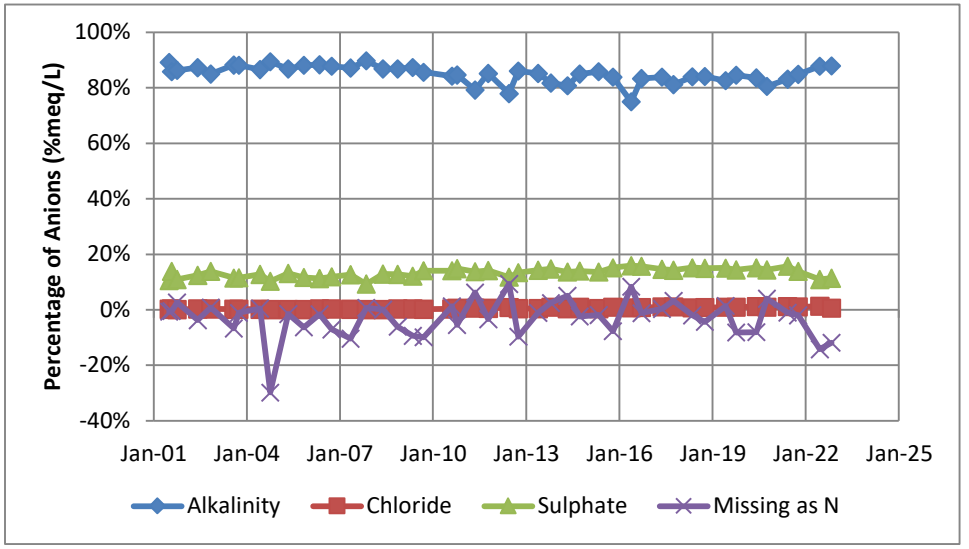


Soccer Field

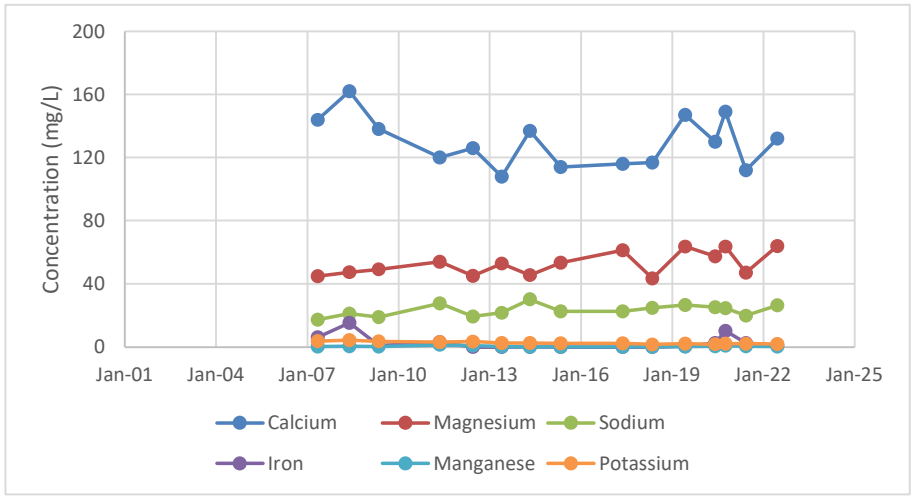








Cement Plant


Concentration (mg/L)
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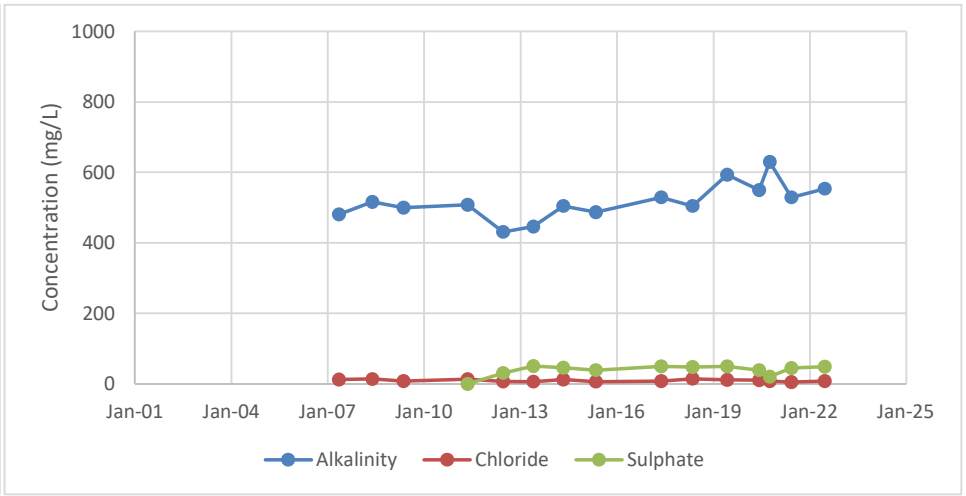
160
120
80
40
0
Jan-01
Jan-04
Jan-07
Jan-10
Jan-13
Jan-16
Jan-19
Jan-22
Jan-25
Calcium
Magnesium
Sodium
Iron
Manganese
Potassium


Concentration (mg/L)
1000
800
600
400
200
0
Jan-01
Jan-04
Jan-07
Jan-10
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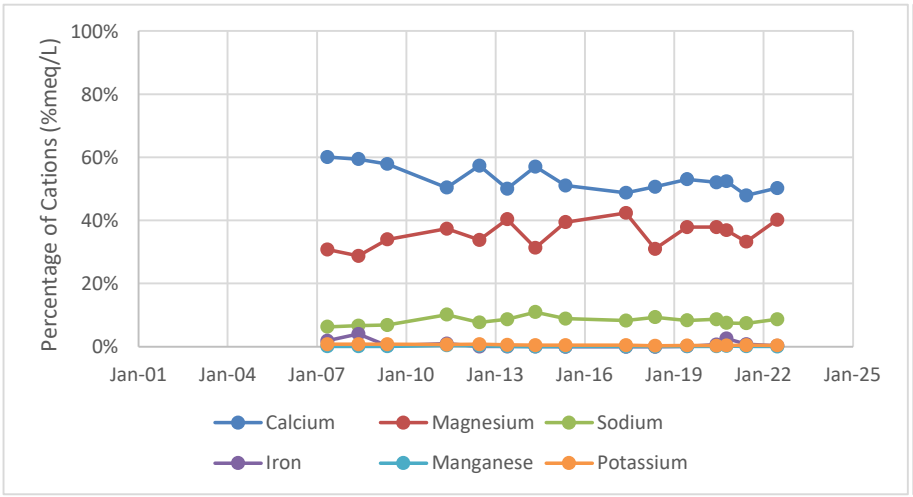
Jan-16
Jan-19
Jan-22
Jan-25
Alkalinity
Chloride
Sulphate


Percentage of Cations (%meq/L)
100%
80%
60%
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Jan-01
Jan-04
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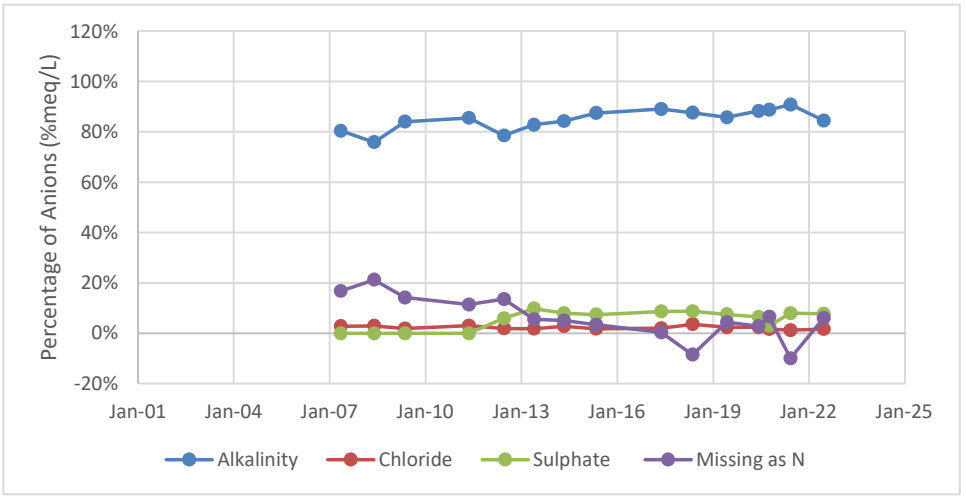
Manganese
Potassium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Jan-01
Jan-04
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Alkalinity
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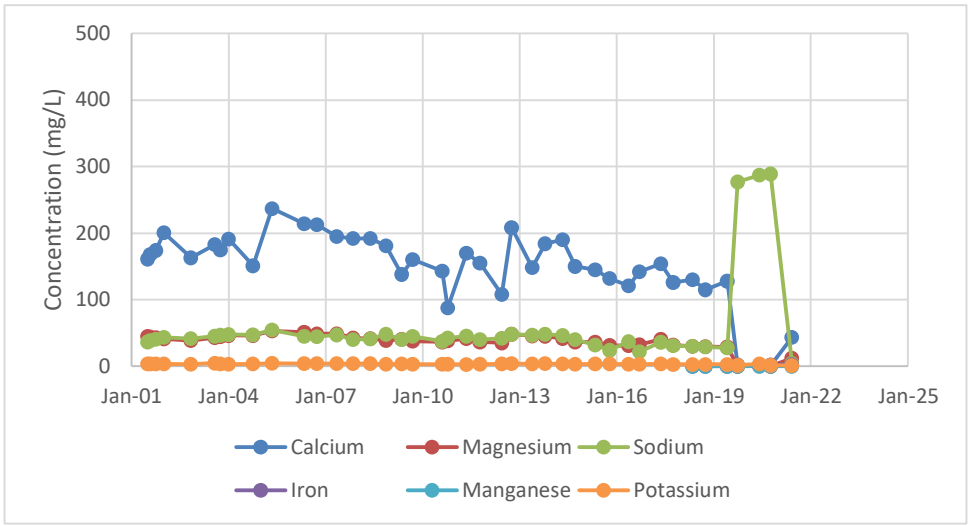
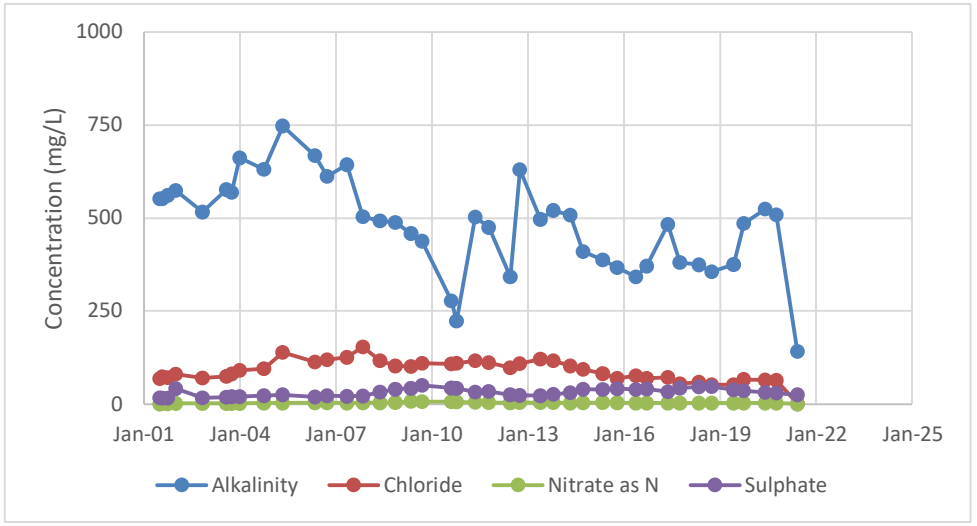
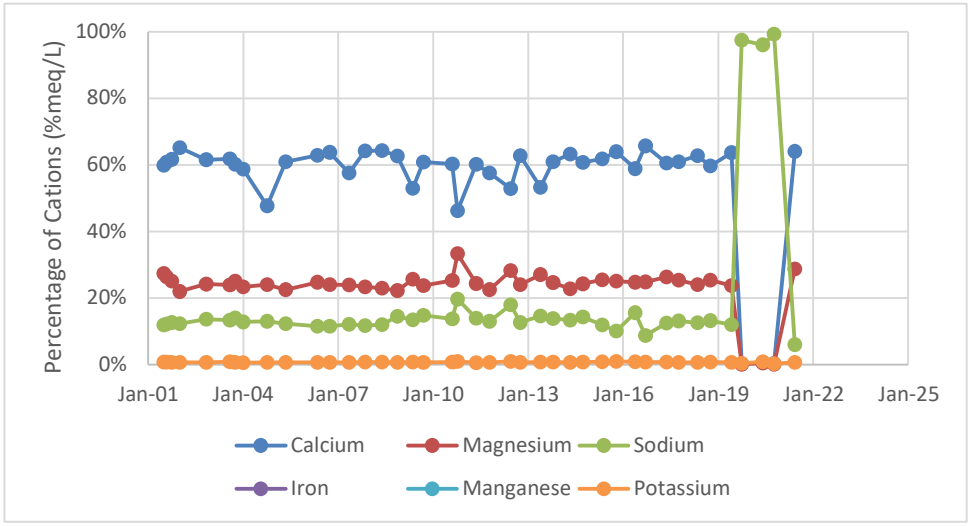
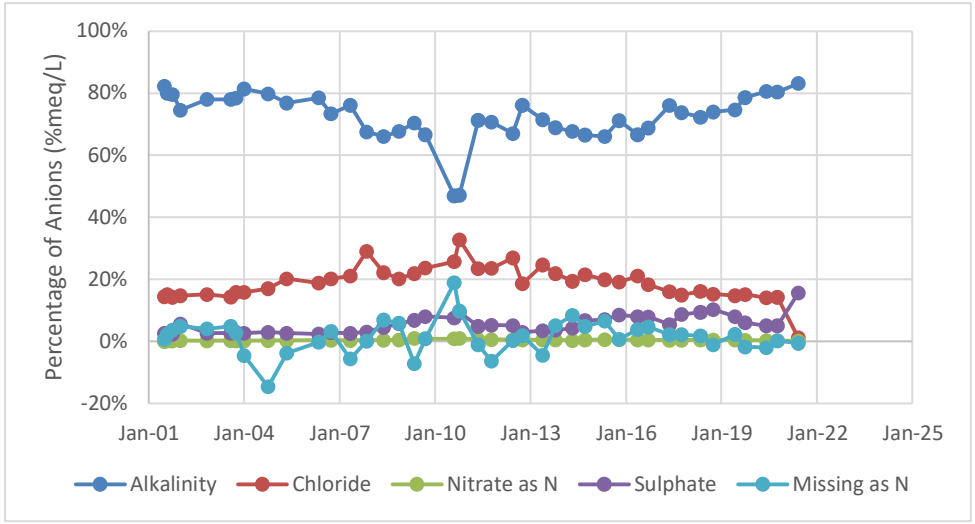
Sulphate
Missing as N

MW07-12









DW-4 - Water softener in use after June 2019

Appendix I

Qualified Professionals Declarations and Statement of Limitations

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Conflict of Interest Disclosure Statement

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

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

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

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

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

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

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

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

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

Declaration

I Leslie Hardy, as a member of Engineers and Geoscientists BC declare

Select one of the following:

☒ Absence from conflict of interest

Other than the standard fee I will receive for my professional services, I have no financial or other interest in the outcome of this 2022 Annual Monitoring Report . I further declare that should a conflict of interest arise in the future during the course of this work, I will fully disclose the circumstances in writing and without delay to **Daniel Bings**, erring on the side of caution.

☐ Real or perceived conflict of interest

Description and nature of conflict(s):

_____

_____

_____

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

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

_____

_____

_____

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

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

Signature:

X _____

Print name: Leslie Hardy, M.Sc., P.Eng.

Witnessed by:

X _____

Print name: Dean Wall, M.Sc., P.Eng.

Date: 3 March 2023

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

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

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

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Declaration of Competency

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

1. Name of Qualified Professional: Leslie Hardy

   Title: Senior Hydrogeologist

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

   Name of Association: Engineers and Geoscientists of BC Registration #: 22047

3. Brief description of professional services:

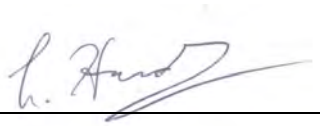
   2022 Annual Monitoring Report, Quesnel Municipal Landfill for the City of Quesnel

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

Declaration

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

Signature:

X 

Print Name: Leslie Hardy

Witnessed by:

X 

Print Name: Dean Wall

Date signed: 3 March 2023

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Conflict of Interest Disclosure Statement

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

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

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

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

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

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

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

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

Declaration

I Maylee Eisbrenner, as a member of Engineers and Geoscientists BC declare

Select one of the following:

☒ Absence from conflict of interest

Other than the standard fee I will receive for my professional services, I have no financial or other interest in the outcome of this 2022 Annual Monitoring Report. I further declare that should a conflict of interest arise in the future during the course of this work, I will fully disclose the circumstances in writing and without delay to **Daniel Bings**, erring on the side of caution.

☐ Real or perceived conflict of interest

Description and nature of conflict(s):

_____

_____

_____

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

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

_____

_____

_____

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

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

Signature:

X _____

Print name: Maylee Eisbrenner, P.Eng.

Witnessed by:

X _____

Print name: Dean Wall, M.Sc., P.Eng.

Date: 3 March 2023

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

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BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Declaration of Competency

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

1. Name of Qualified Professional: Maylee Eisbrenner

   Title: Environmental Engineer

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

   Name of Association: Engineers and Geoscientists of BC Registration # 51464

3. Brief description of professional services:
   2022 Annual Monitoring Report, Quesnel Municipal Landfill for the City of Quesnel

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

Declaration

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

Signature:

X 

Print Name: Maylee Eisbrenner

Witnessed by:

X 

Print Name: Dean Wall

Date signed: 3 March 2023

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

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

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

Limitations

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:
   a. The Standard Terms and Conditions which form a part of our Professional Services Contract;
   b. The Scope of Services;
   c. Time and Budgetary limitations as described in our Contract; and
   d. The Limitations stated herein.
2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.
3. The conclusions presented in this report were based, in part, on visual observations of the Site and attendant structures. Our conclusions cannot and are not extended to include those portions of the Site or structures, which are not reasonably available, in WSP's opinion, for direct observation.
4. The environmental conditions at the Site were assessed, within the limitations set out above, having due regard for applicable environmental regulations as of the date of the inspection. A review of compliance by past owners or occupants of the Site with any applicable local, provincial or federal bylaws, orders-in-council, legislative enactments and regulations was not performed.
5. The Site history research included obtaining information from third parties and employees or agents of the owner. No attempt has been made to verify the accuracy of any information provided, unless specifically noted in our report.
6. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other substances, or different quantities of substances testing for, may be present on-site and may be revealed by different or other testing not provided for in our contract.
7. Because of the limitations referred to above, different environmental conditions from those stated in our report may exist. Should such different conditions be encountered, WSP must be notified in order that it may determine if modifications to the conclusions in the report are necessary.
8. The utilization of WSP's services during the implementation of any remedial measures will allow WSP to observe compliance with the conclusions and recommendations contained in the report. WSP's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.
9. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. WSP accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.
10. This report is not to be given over to any third party for any purpose whatsoever without the written permission of WSP.
11. Provided that the report is still reliable, and less than 12 months old, WSP will issue a third-party reliance letter to parties that the client identifies in writing, upon payment of the then current fee for such letters. All third parties relying on WSP's report, by such reliance agree to be bound by our proposal and WSP's standard reliance letter. WSP's standard reliance letter indicates that in no event shall WSP be liable for any damages, howsoever arising, relating to third-party reliance on WSP's report. No reliance by any party is permitted without such agreement.