



Report Date: April 04, 2024

File:UA196560

Report Number: 221146

Fraser Valley Renewables Ltd.
2200 West Railway Street
Abbotsford BC
V2S 2E2

Dear Fraser Valley Renewables Ltd.,

Re: An Administrative Penalty Referral

On February 29, 2024, Ministry of Environment and Climate Change Strategy (Ministry) Environmental Protection Officers Connor Fraleigh and Oana Enick (Ministry staff) conducted an on-site inspection of Fraser Valley Renewables Ltd.'s (FVR) historical land application site on farm property located at 810 Iverson Road, Lindell Beach, BC (Site). The purpose of the inspection was to verify compliance with the *Environmental Management Act* (EMA) in response to a complaint that was received on February 12, 2024. The Site did not have an authorization in place with the Ministry at the time of the inspection. Present during the inspection was Simon Thorogood (Business Development Manager, Fraser Valley Renewables Ltd.).

To complete this inspection, supplemental information was provided by Simon Thorogood via email.

For your information, this inspection record is being referred for an Administrative Penalty.

Inspection Details:

The inspection period for this report is from November 18, 2022 to March 14, 2024 (Inspection Period) and included a review of the following documents:

- ALS Sample Results dated March 11, 2024, for samples collected on February 29, 2024 (ALS Sample Data)
- FVR Site Drawing provided by FVR via email on March 14, 2024 (Site Map)
- Email correspondence received from Simon Thorogood on March 14, 2024 (Email)

Compliance Assessment

Below are the requirements that were assessed for compliance during this inspection, as well as the associated details/findings and any actions required.

Requirement Description:

Environmental Management Act, Environmental Management Act

6 (3): Subject to subsection (5), a person must not introduce or cause or allow to be introduced into the environment, waste produced by a prescribed activity or operation.

Details/Findings:

Fraser Valley Renewables accepted organic matter waste produced by the Surrey Biofuel Facility (source facility) composting operation and subsequently land applied this material at the Site. A previous inspection (IR198530) confirmed that the organic matter that was received at the Site from the source facility met the Organic Matter Recycling Regulation's (OMRR) Class A compost criteria for pathogen reduction, vector attraction reduction, and metals but failed to meet foreign matter content requirements (i.e. plastics). FVR intended to screen the compost at the Site, to produce a Class A compost, before land applying the compost as a soil amendment at the Site. However, an independent review of the pre-screened compost sample results indicated that the compost also failed to meet the carbon to nitrogen (C:N) ratio requirements of being greater than or equal to 15:1 and less than or equal to 35:1. OMRR Schedule 4 Section 2 requires that retail-grade organic matter and managed organic matter must have (a) foreign matter content less than or equal to 1 percent dry weight, and (b) no sharp foreign matter, such as glass or metal shards, in a size and shape that can cause injury. The source facility confirmed that material delivered to the Site was considered "Mids fraction" and defined it as contaminant-laden organic matter that requires additional screening to separate the organic fraction and unscreened compost.

Schedule 2 of the Waste Discharge Regulation (WDR) defines composting operations as "composting of organic wastes or other feedstocks". Section 2(1) of the OMRR states "For the purposes of the Act, compostable materials and recyclable materials continue to be a waste until dealt with in accordance with this regulation." Ministry staff searched the Ministry's Authorization Management System (AMS) on March 14, 2024, and confirmed that FVR does not currently hold an EMA authorization to discharge to the environment for this Site. Since the material that was produced by the composting operation failed to meet the quality criteria for Class A compost, it is considered a waste. As no authorization is present for the Site, FVR introduced or caused or allowed to be introduced into the environment, waste produced by a prescribed activity or operation under Schedule 2 of the WDR.

Timeline of events leading up to this inspection:

- On August 8, 2022, the Ministry received complaints regarding waste material being brought to a site and land applied.
- On September 29, 2022, the Ministry issued an Advisory for causing or allowing waste produced by a prescribed activity or operation to be introduced into the environment.
- On October 19, 2022, the Agricultural Land Commission (ALC) issued a Stop Work Order to cease the land application of waste.
- On October 31, 2022, the Ministry issued a Warning for causing or allowing waste produced by a prescribed activity or operation to be introduced into the environment.
- On December 5, 2022, the Ministry issued a Warning for causing or allowing waste produced by a prescribed activity or operation to be introduced into the environment.
- On January 3, 2023, FVR submitted an action plan in response to the Ministry's December 5, 2022, Warning, which involved piling and covering the land applied waste material with plastic liner to prevent the further discharge of waste into the environment with the intent to further process the waste under the OMRR to meet Class A compost.
- On February 17, 2023, FVR confirmed that all but one waste pile had been covered
- On March 17, 2023, FVR submitted a Non-farm Use Application to process the waste on-site
- On May 19, 2023, the ALC refused the Non-farm Use Application to allow for processing of the waste on-site
- On June 30, 2023, the ALC issued a Remediation Order (RO) which requires removal of the waste material from the Site by May 31, 2024.

On February 12, 2024, Ministry staff received a complaint that there were uncovered waste piles at the Site resulting in leachate being discharged to the ground. Photographs of the Site that were taken on January 31, 2024, were provided which showed that some of the waste piles on-site were uncovered with suspected leachate pooling at the base of the piles.

On February 29, 2024, Ministry staff attended the site to follow up on the complaint. During the on-site inspection, Ministry staff observed the waste material in windrows of various sizes. Ministry staff observed tarps covering the waste material with the exception of one pile (Photo 6, Pile C). FVR staff informed Ministry staff that this pile has not been covered due to

**Ministry of Environment
and Climate Change
Strategy**

Compliance and
Environmental
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the size of the pile citing safety concerns. Of the waste piles that were covered, Ministry staff observed that some of the sections of the tarps had partially blown off due to wind (Photos 1 and 2). At the base of these waste piles, moderate volumes of leachate were observed discharging to the ground or running off as overland flow (Photos 3, 4 and 5).

Leachate samples were collected during the on-site inspection at three locations as identified on the Site Map (Photo 6). The analytical results are included in the appendix of this report (ALS Sample Data). The Site is situated in a high precipitation area and over a vulnerable aquifer recharge area in Chilliwack Map B3 (a), as referenced in the Code of Practice for Agricultural Environmental Management. A search of the British Columbia Soil Information Finder Tool shows that the site is situated on silt loam which is classified as well drained soil. Based on this information and a review of the ALS Sample Data, the discharge of leachate to the ground at this Site could be a potential source of contamination for groundwater.

An Email received on March 14, 2024, stated that there are roughly 600 tonnes of unscreened material, 4,000 tonnes of overs (mids), 1,800 tonnes of screened material, 6,000 tonnes of compost and 2,000 tonnes of topsoil currently on-site; which represents a total of 14,400 tonnes of material remaining. The Email confirmed that to date, roughly 1,000 tonnes of waste has been removed from the site following the issuance of the ALC RO. During the on-site inspection, FVR staff confirmed that a majority of the waste material was received by the source facility, however, FVR staff indicated that some of the waste material was imported from other facilities. Upon request, FVR did not confirm the quantities of waste received from these other sites or the source sites for these materials.

Following the Warning letter that was issued on December 5, 2022, FVR has continued to allow waste produced by a prescribed activity or operation to be discharged into the environment at the Site. While progress has been made to reduce the volume of waste being discharged to the environment at the Site by covering the piles, large volumes of leachate continue to be discharged to the ground resulting from the uncovered waste piles.

Non-compliance with Section 6(3) of the EMA was identified during three previous inspections completed by the Ministry. An inspection that was conducted on September 29, 2022 (196560), October 31, 2022 (IR198530), and December 5, 2022 (199678) found the Site had introduced or caused or allowed to be introduced into the environment, waste produced by a prescribed activity or operation under Schedule 2 of the WDR.

As a result, this non-compliance is being referred for administrative penalty.

Compliance:

Out

Actions to be taken:

FVR must immediately cease the unauthorized discharge of waste into the environment and implement additional measures to reduce the risks to the receiving environment.

Compliance History:

2022-12-05 IR 199678 Warning Unauthorized 6(3): Environmental Management Act 6 (3)

2022-10-31 IR 198530 Warning Unauthorized 6(3): Environmental Management Act 6 (3)

2022-09-29 IR 196560 Advisory: Environmental Management Act 6 (3), Organic Matter Recycling Regulation (18/2002) (EMA) 15 (1)(a); 22 (1)(a)

The Ministry of Environment Compliance and Enforcement Policy and Procedure (C&E Policy) prescribes common requirements and procedures for all Ministry staff to ensure consistent and risk-based assessment and response to non-compliance. Using the Non-Compliance Decision Matrix, the compliance determination for this inspection has been assessed as **Level 2, Category C, AMP**.

More information about Environmental Compliance, the Non-Compliance Decision Matrix, and reporting and data submission requirements can be found at the links below:

General compliance information:

www.gov.bc.ca/environmentalcompliance

Non-Compliance Decision Matrix information:

www.gov.bc.ca/environment/how-compliance-is-assessed

Reporting and data submission requirements (to be sent to EnvAuthorizationsReporting@gov.bc.ca):

<https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/comply>

Please be advised that this inspection report may be published on the provincial government website within 7 days.

Below are attachments related to this inspection.

If you have any questions about this letter, please contact the undersigned.

Yours truly,

Connor Fraleigh
Environmental Protection Officer

cc:

Attachments:

- 1) Photo 1: Viewing north towards partially covered piles of compost process mids/overs
- 2) Photo 2: Viewing northeast towards partially covered piles of compost process mids/overs
- 3) Photo 3: Viewing north towards leachate discharging to ground at the base of mids/overs waste piles
- 4) Photo 4: Viewing southeast towards a combined leachate/ stormwater pooling area
- 5) Photo 5: Viewing east towards leachate discharging to ground at the base of an unscreened pile of waste
- 6) Photo 6: Site Map
- 7) ALS Lab Data

Deliver via:

Email: Fax: Mail:
Registered Mail: Hand Delivery:

**Ministry of Environment
and Climate Change
Strategy**

Compliance and
Environmental
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DISCLAIMER:

Please note that sections of the permit, regulation or code of practice referenced in this inspection record are for guidance and are not the official version. Please refer to the original permit, regulation or code of practice.

To see the most up to date version of the regulations and codes of practices please visit
<http://www.bclaws.ca>

If you require a copy of the original permit, please contact the inspector noted on this inspection record.

It is also important to note that this inspection record does not necessarily reflect each requirement or condition of the authorization therefore compliance is noted only for the requirements or conditions listed in the inspection record.



Photo 1: Viewing north towards partially covered piles of compost process mids/overs



Photo 2: Viewing northeast towards partially covered piles of compost process mids/overs



Photo 3: Viewing north towards leachate discharging to ground at the base of mids/overs waste piles



Photo 4: Viewing southeast towards a combined leachate/stormwater pooling area.



Photo 5: Viewing east towards leachate discharging to ground at the base of an unscreened pile of waste

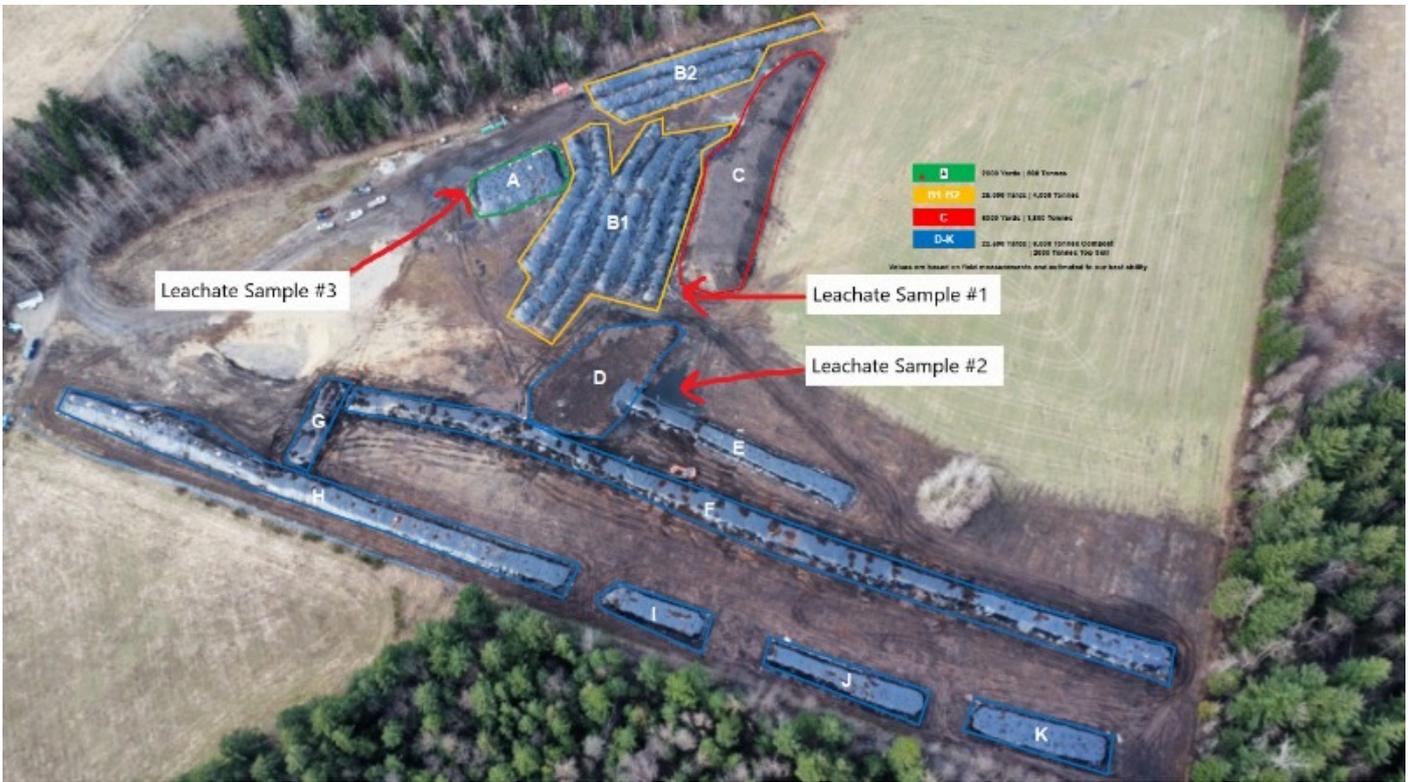


Photo 6: Site Map



CERTIFICATE OF ANALYSIS

<p>Work Order : VA24A4191</p> <p>Client : BC Ministry of Environment & Climate Change Strategy</p> <p>Contact : Connor Fraleigh</p> <p>Address : 200 - 10470 152 Street Surrey BC Canada V3R 0Y3</p> <p>Telephone : 604 582 5216</p> <p>Project : ----</p> <p>PO : ----</p> <p>C-O-C number : 20-975329</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : Contract # GS20JHQ073MY</p> <p>No. of samples received : 3</p> <p>No. of samples analysed : 3</p>	<p>Page : 1 of 6</p> <p>Laboratory : ALS Environmental - Vancouver</p> <p>Account Manager : Dean Watt</p> <p>Address : 8081 Lougheed Highway Burnaby BC Canada V5A 1W9</p> <p>Telephone : +1 604 253 4188</p> <p>Date Samples Received : 29-Feb-2024 16:30</p> <p>Date Analysis Commenced : 29-Feb-2024</p> <p>Issue Date : 11-Mar-2024 12:05</p>
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Arshdeep Kaur	Lab Assistant	Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Inorganics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Leon Yang	Analyst	Microbiology, 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).

<i>Unit</i>	<i>Description</i>
-	no units
µg/L	micrograms per litre
CFU/100mL	colony forming units per hundred millilitres
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLA	Detection Limit adjusted for required dilution.
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).
MBER	Estimated Result (Microbiological test). Colony count outside ideal range. Result calculated from most nearly acceptable value.



Analytical Results

Sub-Matrix: Leachate

Client sample ID

(Matrix: Water)

					Leachate 1	Leachate 2	Leachate 3	----	----
Client sampling date / time					29-Feb-2024 12:40	29-Feb-2024 12:45	29-Feb-2024 13:00	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24A4191-001	VA24A4191-002	VA24A4191-003	-----	-----
					Result	Result	Result	----	----
Physical Tests									
Hardness (as CaCO ₃), dissolved	----	EC100/VA	0.50	mg/L	2230	1250	132	----	----
Hardness (as CaCO ₃), from total Ca/Mg	----	EC100A/VA	0.50	mg/L	2260	1130	127	----	----
pH	----	E108/VA	0.10	pH units	7.91	8.27	8.27	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	817	326	3.15	----	----
Nitrate (as N)	14797-55-8	E235.NO3-T/V A	0.0030	mg/L	23.2	<0.150 ^{DLDS}	<0.150 ^{DLDS}	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	<0.0500 ^{DLDS}	<0.0500 ^{DLDS}	<0.0500 ^{DLDS}	----	----
Nitrogen, total	7727-37-9	E366/VA	0.030	mg/L	937	382	4.88	----	----
Microbiological Tests									
Coliforms, thermotolerant [fecal]	----	E012.FC/VA	1	CFU/100mL	1000 ^{MBER}	9000 ^{MBER}	<1000 ^{DLM}	----	----
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	19.8	3.74	0.333	----	----
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	0.0110	0.00804	0.00028	----	----
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	0.128	0.0681	0.00191	----	----
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.0642	0.0646	0.0168	----	----
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L	0.000311	<0.000100	<0.000100	----	----
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L	<0.000500 ^{DLM}	<0.000250 ^{DLA}	<0.000050	----	----
Boron, total	7440-42-8	E420/VA	0.010	mg/L	8.33	2.85	0.221	----	----
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L	0.000490	0.000202	0.0000189	----	----
Calcium, total	7440-70-2	E420/VA	0.050	mg/L	610	331	47.0	----	----
Chromium, total	7440-47-3	E420.Cr-L/VA	0.00010	mg/L	0.0490	0.0111	0.00057	----	----
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L	0.0118	0.00452	0.00036	----	----
Copper, total	7440-50-8	E420/VA	0.00050	mg/L	0.0184	0.0174	0.00325	----	----
Iron, total	7439-89-6	E420-L/VA	0.0050	mg/L	20.7	3.37	0.344	----	----
Lead, total	7439-92-1	E420/VA	0.000050	mg/L	0.00433	0.00210	0.000191	----	----
Magnesium, total	7439-95-4	E420/VA	0.0050	mg/L	178	73.2	2.46	----	----
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L	2.43	1.05	0.0583	----	----
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L	0.0115	0.00733	0.00124	----	----



Analytical Results

Sub-Matrix: Leachate

Client sample ID

(Matrix: Water)

					Leachate 1	Leachate 2	Leachate 3	----	----
Client sampling date / time					29-Feb-2024 12:40	29-Feb-2024 12:45	29-Feb-2024 13:00	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24A4191-001	VA24A4191-002	VA24A4191-003	-----	-----
					Result	Result	Result	----	----
Total Metals									
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L	0.0785	0.0247	0.00106	----	----
Phosphorus, total	7723-14-0	E420-L/VA	0.030	mg/L	13.3	3.02	0.208	----	----
Potassium, total	7440-09-7	E420/VA	0.050	mg/L	1330	567	19.8	----	----
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L	0.00251	0.00132	0.000105	----	----
Silicon, total	7440-21-3	E420/VA	0.10	mg/L	16.5	6.33	0.83	----	----
Silver, total	7440-22-4	E420/VA	0.000010	mg/L	<0.000100 ^{DLM}	0.000065	<0.000010	----	----
Sodium, total	7440-23-5	E420/VA	0.050	mg/L	626	268	7.73	----	----
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L	3.77	1.92	0.259	----	----
Sulfur, total	7704-34-9	E420/VA	0.50	mg/L	1290	546	40.1	----	----
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L	0.000127	0.000051	<0.000010	----	----
Tin, total	7440-31-5	E420/VA	0.00010	mg/L	0.136	0.137	0.00068	----	----
Titanium, total	7440-32-6	E420/VA	0.00030	mg/L	0.0525	0.0755	0.0148	----	----
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L	0.000396	0.000401	0.000048	----	----
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L	0.0446	0.0110	0.00128	----	----
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L	0.352	0.107	0.0048	----	----
Dissolved Metals									
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L	1.52	0.634	0.0402	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L	0.0104	0.00593	0.00026	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L	0.117	0.0609	0.00182	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L	0.0122	0.0315	0.0146	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L	<0.000200	<0.000100	<0.000100	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L	<0.000500	<0.000250	<0.000050	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L	8.88	3.50	0.222	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L	<0.0000500	<0.0000250	0.0000086	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L	607	377	48.4	----	----
Chromium, dissolved	7440-47-3	E421.Cr-L/VA	0.00010	mg/L	0.0253	0.00788	0.00022	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L	0.00714	0.00278	0.00018	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L	<0.00200	<0.00100	0.00246	----	----
Iron, dissolved	7439-89-6	E421-L/VA	0.0050	mg/L	6.38	0.153	0.0270	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L	<0.000500	<0.000250	<0.000050	----	----



Analytical Results

Sub-Matrix: Leachate

Client sample ID

(Matrix: Water)

					Leachate 1	Leachate 2	Leachate 3	----	----
Client sampling date / time					29-Feb-2024 12:40	29-Feb-2024 12:45	29-Feb-2024 13:00	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24A4191-001	VA24A4191-002	VA24A4191-003	-----	-----
					Result	Result	Result	----	----
Dissolved Metals									
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L	174	75.2	2.66	----	----
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L	2.38	1.06	0.00924	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L	0.00827	0.00152	0.00113	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L	0.0625	0.0206	0.00080	----	----
Phosphorus, dissolved	7723-14-0	E421-L/VA	0.010	mg/L	1.50	0.928	0.090	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L	1320	579	21.6	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L	0.00263	0.00116	0.000070	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.100	mg/L	14.3	5.42	0.328	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L	<0.000100	<0.000050	<0.000010	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L	665	295	8.29	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L	3.50	1.91	0.254	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L	1220	708	36.2	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L	<0.000100	<0.000050	0.000011	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L	0.176	0.0977	0.00022	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L	0.0398	<0.0261 ^{DLM}	0.00066	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L	0.000419	0.000347	0.000044	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L	0.0370	0.00880	0.00054	----	----
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L	0.0104	0.0152	0.0016	----	----
Dissolved metals filtration location	----	EP421/VA	-	-	Laboratory	Laboratory	Laboratory	----	----
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A/VA	0.50	µg/L	<0.50	<0.50	<0.50	----	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L	5.17	<0.50	<0.50	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L	<0.50	<0.50	<0.50	----	----
Styrene	100-42-5	E611A/VA	0.50	µg/L	0.55	<0.50	<0.50	----	----
Toluene	108-88-3	E611A/VA	0.50	µg/L	5.59	<0.50	<0.50	----	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L	<0.40	<0.40	<0.40	----	----
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L	<0.30	<0.30	<0.30	----	----
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L	<0.50	<0.50	<0.50	----	----
BTEX, total	----	E611A/VA	1.0	µg/L	10.8	<1.0	<1.0	----	----
Hydrocarbons									



Analytical Results

Sub-Matrix: Leachate

(Matrix: Water)

					Client sample ID	Leachate 1	Leachate 2	Leachate 3	----	----
					Client sampling date / time	29-Feb-2024 12:40	29-Feb-2024 12:45	29-Feb-2024 13:00	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24A4191-001	VA24A4191-002	VA24A4191-003	-----	-----	
					Result	Result	Result	----	----	
Hydrocarbons										
VHw (C6-C10)	----	E581.VH+F1/ VA	100	µg/L	160	310	<100	----	----	
VPHw	----	EC580A/VA	100	µg/L	150	310	<100	----	----	
Hydrocarbons Surrogates										
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/ VA	1.0	%	86.2	86.4	97.4	----	----	
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%	95.0	95.0	95.7	----	----	
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%	99.5	96.1	96.7	----	----	

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

Please refer to the Accreditation section for an explanation of analyte accreditations.



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : VA24A4191</p> <p>Client : BC Ministry of Environment & Climate Change Strategy</p> <p>Contact : Connor Fraleigh</p> <p>Address : 200 - 10470 152 Street Surrey BC Canada V3R 0Y3</p> <p>Telephone : ----</p> <p>Project : ----</p> <p>PO : ----</p> <p>C-O-C number : 20-975329</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : Contract # GS20JHQ073MY</p> <p>No. of samples received : 3</p> <p>No. of samples analysed : 3</p>	<p>Page : 1 of 12</p> <p>Laboratory : ALS Environmental - Vancouver</p> <p>Account Manager : Dean Watt</p> <p>Address : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p>Telephone : +1 604 253 4188</p> <p>Date Samples Received : 29-Feb-2024 16:30</p> <p>Issue Date : 11-Mar-2024 12:04</p>
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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 : Analytical Method 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	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Leachate 1	E298	29-Feb-2024	06-Mar-2024	28 days	6 days	✔	08-Mar-2024	28 days	8 days	✔
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Leachate 2	E298	29-Feb-2024	06-Mar-2024	28 days	6 days	✔	08-Mar-2024	28 days	8 days	✔
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Leachate 3	E298	29-Feb-2024	06-Mar-2024	28 days	6 days	✔	08-Mar-2024	28 days	8 days	✔
Anions and Nutrients : Nitrate in Water by IC (Trace Level)										
HDPE Leachate 1	E235.NO3-T	29-Feb-2024	02-Mar-2024	3 days	2 days	✔	04-Mar-2024	3 days	3 days	✔
Anions and Nutrients : Nitrate in Water by IC (Trace Level)										
HDPE Leachate 2	E235.NO3-T	29-Feb-2024	02-Mar-2024	3 days	2 days	✔	04-Mar-2024	3 days	3 days	✔
Anions and Nutrients : Nitrate in Water by IC (Trace Level)										
HDPE Leachate 3	E235.NO3-T	29-Feb-2024	02-Mar-2024	3 days	2 days	✔	04-Mar-2024	3 days	3 days	✔
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Leachate 1	E235.NO2-L	29-Feb-2024	02-Mar-2024	3 days	2 days	✔	04-Mar-2024	3 days	3 days	✔



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method 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		
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE Leachate 2	E235.NO2-L	29-Feb-2024	02-Mar-2024	3 days	2 days	✓	04-Mar-2024	3 days	3 days	✓	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE Leachate 3	E235.NO2-L	29-Feb-2024	02-Mar-2024	3 days	2 days	✓	04-Mar-2024	3 days	3 days	✓	
Anions and Nutrients : Total Nitrogen by Colourimetry											
Amber glass total (sulfuric acid) Leachate 1	E366	29-Feb-2024	06-Mar-2024	28 days	6 days	✓	07-Mar-2024	28 days	7 days	✓	
Anions and Nutrients : Total Nitrogen by Colourimetry											
Amber glass total (sulfuric acid) Leachate 2	E366	29-Feb-2024	06-Mar-2024	28 days	6 days	✓	07-Mar-2024	28 days	7 days	✓	
Anions and Nutrients : Total Nitrogen by Colourimetry											
Amber glass total (sulfuric acid) Leachate 3	E366	29-Feb-2024	06-Mar-2024	28 days	6 days	✓	07-Mar-2024	28 days	7 days	✓	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE - dissolved (lab preserved) Leachate 1	E421.Cr-L	29-Feb-2024	04-Mar-2024	180 days	4 days	✓	05-Mar-2024	180 days	5 days	✓	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE - dissolved (lab preserved) Leachate 2	E421.Cr-L	29-Feb-2024	04-Mar-2024	180 days	4 days	✓	05-Mar-2024	180 days	5 days	✓	
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)											
HDPE - dissolved (lab preserved) Leachate 3	E421.Cr-L	29-Feb-2024	04-Mar-2024	180 days	4 days	✓	05-Mar-2024	180 days	5 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS (Additional Low Level Metals)											
HDPE - dissolved (lab preserved) Leachate 1	E421-L	29-Feb-2024	04-Mar-2024	180 days	4 days	✓	05-Mar-2024	180 days	5 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method 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		
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS (Additional Low Level Metals)											
HDPE - dissolved (lab preserved) Leachate 2	E421-L	29-Feb-2024	04-Mar-2024	180 days	4 days	✓	05-Mar-2024	180 days	5 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS (Additional Low Level Metals)											
HDPE - dissolved (lab preserved) Leachate 3	E421-L	29-Feb-2024	04-Mar-2024	180 days	4 days	✓	05-Mar-2024	180 days	5 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE - dissolved (lab preserved) Leachate 1	E421	29-Feb-2024	04-Mar-2024	180 days	4 days	✓	05-Mar-2024	180 days	5 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE - dissolved (lab preserved) Leachate 2	E421	29-Feb-2024	04-Mar-2024	180 days	4 days	✓	05-Mar-2024	180 days	5 days	✓	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS											
HDPE - dissolved (lab preserved) Leachate 3	E421	29-Feb-2024	04-Mar-2024	180 days	4 days	✓	05-Mar-2024	180 days	5 days	✓	
Hydrocarbons : VH and F1 by Headspace GC-FID											
Glass vial (sodium bisulfate) Leachate 1	E581.VH+F1	29-Feb-2024	04-Mar-2024	14 days	4 days	✓	04-Mar-2024	14 days	4 days	✓	
Hydrocarbons : VH and F1 by Headspace GC-FID											
Glass vial (sodium bisulfate) Leachate 2	E581.VH+F1	29-Feb-2024	05-Mar-2024	14 days	5 days	✓	05-Mar-2024	14 days	5 days	✓	
Hydrocarbons : VH and F1 by Headspace GC-FID											
Glass vial (sodium bisulfate) Leachate 3	E581.VH+F1	29-Feb-2024	05-Mar-2024	14 days	5 days	✓	05-Mar-2024	14 days	5 days	✓	
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)											
Sterile HDPE (Sodium thiosulphate) Leachate 1	E012.FC	29-Feb-2024	----	----	----		29-Feb-2024	30 hrs	6 hrs	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method 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	
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)										
Sterile HDPE (Sodium thiosulphate) Leachate 2	E012.FC	29-Feb-2024	----	----	----		29-Feb-2024	30 hrs	6 hrs	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)										
Sterile HDPE (Sodium thiosulphate) Leachate 3	E012.FC	29-Feb-2024	----	----	----		29-Feb-2024	30 hrs	6 hrs	✓
Physical Tests : pH by Meter										
HDPE Leachate 1	E108	29-Feb-2024	02-Mar-2024	0.25 hrs	50 hrs	* EHTR-FM	04-Mar-2024	0.25 hrs	89 hrs	* EHTR-FM
Physical Tests : pH by Meter										
HDPE Leachate 2	E108	29-Feb-2024	02-Mar-2024	0.25 hrs	50 hrs	* EHTR-FM	04-Mar-2024	0.25 hrs	89 hrs	* EHTR-FM
Physical Tests : pH by Meter										
HDPE Leachate 3	E108	29-Feb-2024	02-Mar-2024	0.25 hrs	50 hrs	* EHTR-FM	04-Mar-2024	0.25 hrs	89 hrs	* EHTR-FM
Total Metals : Total Chromium in Water by CRC ICPS (Low Level)										
HDPE total (nitric acid) Leachate 1	E420.Cr-L	29-Feb-2024	05-Mar-2024	180 days	5 days	✓	06-Mar-2024	180 days	6 days	✓
Total Metals : Total Chromium in Water by CRC ICPS (Low Level)										
HDPE total (nitric acid) Leachate 2	E420.Cr-L	29-Feb-2024	05-Mar-2024	180 days	5 days	✓	06-Mar-2024	180 days	6 days	✓
Total Metals : Total Chromium in Water by CRC ICPS (Low Level)										
HDPE total (nitric acid) Leachate 3	E420.Cr-L	29-Feb-2024	05-Mar-2024	180 days	5 days	✓	06-Mar-2024	180 days	6 days	✓
Total Metals : Total Metals by CRC ICPS (Low Level)										
HDPE total (nitric acid) Leachate 1	E420-L	29-Feb-2024	05-Mar-2024	180 days	5 days	✓	06-Mar-2024	180 days	6 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method 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		
Total Metals : Total Metals by CRC ICPMS (Low Level)											
HDPE total (nitric acid) Leachate 2	E420-L	29-Feb-2024	05-Mar-2024	180 days	5 days	✓	06-Mar-2024	180 days	6 days	✓	
Total Metals : Total Metals by CRC ICPMS (Low Level)											
HDPE total (nitric acid) Leachate 3	E420-L	29-Feb-2024	05-Mar-2024	180 days	5 days	✓	06-Mar-2024	180 days	6 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) Leachate 1	E420	29-Feb-2024	05-Mar-2024	180 days	5 days	✓	06-Mar-2024	180 days	6 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) Leachate 2	E420	29-Feb-2024	05-Mar-2024	180 days	5 days	✓	06-Mar-2024	180 days	6 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) Leachate 3	E420	29-Feb-2024	05-Mar-2024	180 days	5 days	✓	06-Mar-2024	180 days	6 days	✓	
Volatile Organic Compounds : BTEX by Headspace GC-MS											
Glass vial (sodium bisulfate) Leachate 1	E611A	29-Feb-2024	04-Mar-2024	14 days	4 days	✓	04-Mar-2024	14 days	4 days	✓	
Volatile Organic Compounds : BTEX by Headspace GC-MS											
Glass vial (sodium bisulfate) Leachate 2	E611A	29-Feb-2024	05-Mar-2024	14 days	5 days	✓	05-Mar-2024	14 days	5 days	✓	
Volatile Organic Compounds : BTEX by Headspace GC-MS											
Glass vial (sodium bisulfate) Leachate 3	E611A	29-Feb-2024	05-Mar-2024	14 days	5 days	✓	05-Mar-2024	14 days	5 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	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Ammonia by Fluorescence	E298	1356441	1	15	6.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1352752	2	40	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	1350532	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1350530	2	19	10.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS (Additional Low Level Metals)	E421-L	1350531	1	9	11.1	5.0	✓
Nitrate in Water by IC (Trace Level)	E235.NO3-T	1352193	1	3	33.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1352189	1	20	5.0	5.0	✓
pH by Meter	E108	1352194	1	4	25.0	5.0	✓
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC	1349701	1	6	16.6	10.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	1351308	1	3	33.3	5.0	✓
Total Metals by CRC ICPMS (Low Level)	E420-L	1351307	1	3	33.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1351306	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	1356442	1	3	33.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1352753	2	14	14.2	5.0	✓
Laboratory Control Samples (LCS)							
Ammonia by Fluorescence	E298	1356441	1	15	6.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1352752	2	40	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	1350532	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1350530	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS (Additional Low Level Metals)	E421-L	1350531	1	9	11.1	5.0	✓
Nitrate in Water by IC (Trace Level)	E235.NO3-T	1352193	1	3	33.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1352189	1	20	5.0	5.0	✓
pH by Meter	E108	1352194	1	4	25.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	1351308	1	3	33.3	5.0	✓
Total Metals by CRC ICPMS (Low Level)	E420-L	1351307	1	3	33.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1351306	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	1356442	1	3	33.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1352753	2	14	14.2	5.0	✓
Method Blanks (MB)							
Ammonia by Fluorescence	E298	1356441	1	15	6.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1352752	2	40	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	1350532	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1350530	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS (Additional Low Level Metals)	E421-L	1350531	1	9	11.1	5.0	✓
Nitrate in Water by IC (Trace Level)	E235.NO3-T	1352193	1	3	33.3	5.0	✓



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

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Method Blanks (MB) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	1352189	1	20	5.0	5.0	✓
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC	1349701	1	6	16.6	10.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	1351308	1	3	33.3	5.0	✓
Total Metals by CRC ICPMS (Low Level)	E420-L	1351307	1	3	33.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1351306	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	1356442	1	3	33.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1352753	2	14	14.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1356441	1	15	6.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1352752	2	40	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	1350532	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1350530	2	19	10.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS (Additional Low Level Metals)	E421-L	1350531	1	9	11.1	5.0	✓
Nitrate in Water by IC (Trace Level)	E235.NO3-T	1352193	1	3	33.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1352189	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	1351308	1	3	33.3	5.0	✓
Total Metals by CRC ICPMS (Low Level)	E420-L	1351307	1	3	33.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1351306	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	1356442	1	3	33.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1352753	2	14	14.2	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
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC ALS Environmental - Vancouver	Water	APHA 9222 D (mod)	Following filtration (0.45 µm), and incubation at 44.5 ±0.2°C for 22-26 hours, colonies exhibiting characteristic morphology of the target organism are enumerated and confirmed.
pH by Meter	E108 ALS Environmental - Vancouver	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.
Nitrite in Water by IC (Low Level)	E235.NO2-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Trace Level)	E235.NO3-T ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Ammonia by Fluorescence	E298 ALS Environmental - Vancouver	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 Nitrogen by Colourimetry	E366 ALS Environmental - Vancouver	Water	Chinchilla Scientific Nitrate Method, 2011	Following digestion, total nitrogen is is determined colourimetrically using a discrete analyzer utilizing the vanadium chloride reduction method. This method of analysis is approved under US EPA 40 CFR Part 136 (May 2021).
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Vancouver	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L ALS Environmental - Vancouver	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Total Metals by CRC ICPMS (Low Level)	E420-L ALS Environmental - Vancouver	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.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L ALS Environmental - Vancouver	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Dissolved Metals in Water by CRC ICPMS (Additional Low Level Metals)	E421-L ALS Environmental - Vancouver	Water	APHA 3030 B/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.
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	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 for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO ₃), 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 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO ₃), 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 ALS Environmental - Vancouver	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.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for Total Nitrogen in water	EP366 ALS Environmental - Vancouver	Water	APHA 4500-P J (mod)	Samples for total nitrogen analysis are digested using a heated persulfate digestion. Nitrogen compounds are converted to nitrate in this digestion.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	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.



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Chain of Custody (COC) / Analytical Request Form

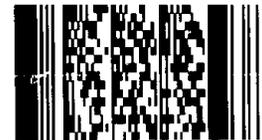
COC Number: 20 - 975329

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Report To Contact and company name below will appear on the final report		Reports / Recipients			Turnaround Time (TAT) Requested			AFFIX ALS BARCODE LABEL HERE (ALS use only)										
Company: Ministry of Environment		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			<input checked="" type="checkbox"/> Routine (R) if received by 3pm M-F - no surcharges apply													
Contact: Connor Fraleigh		Merge QC/QCI Reports with COA: <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A			<input type="checkbox"/> 4 day (P4) if received by 3pm M-F - 20% rush surcharge minimum													
Phone: 250-417-9972		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked			<input type="checkbox"/> 3 day (P3) if received by 3pm M-F - 25% rush surcharge minimum													
Company address below will appear on the final report		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			<input type="checkbox"/> 2 day (P2) if received by 3pm M-F - 50% rush surcharge minimum			Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm										
Street: 10470 152 St, Suite 200		Email 1 or Fax: Connor.fraleigh@gov.bc.ca			<input type="checkbox"/> 1 day (E) if received by 3pm M-F - 100% rush surcharge minimum													
City/Province: Surrey BC		Email 2:			<input type="checkbox"/> Same day (E2) if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests			For all tests with rush TATs requested, please contact your AM to confirm availability.										
Postal Code: V3R 0Y4		Email 3:			Analysis Request													
Invoice To		Invoice Recipients			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below													
Same as Report To <input type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			NUMBER OF CONTAINERS													
Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO		Email 1 or Fax:			Ammonia Nitrate													
Company: Ministry of Environment		Email 2:			Nitrate (as N)													
Contact:		Email 3:			Nitrite (as N)													
Project Information		Oil and Gas Required Fields (client use)			pH													
ALS Account # / Quote #:		AFE/Cost Center:			Total Metals													
Job #:		Major/Minor Code:			Dissolved Metals													
PO / AFE:		Requisitioner:			Fecal Coliforms													
LSD:		Location:			BTEX													
ALS Lab Work Order # (ALS use only):		ALS Contact:		Sampler:		UPH												
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	Ammonia Nitrate	Nitrate (as N)	Nitrite (as N)	pH	Total Metals	Dissolved Metals	Fecal Coliforms	BTEX	UPH	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
		Leachate 1		29-Feb-24	12:40	Leachate	X	X	X	X	X	X	X	X				
		Leachate 2		29-Feb-24	12:45	Leachate	X	X	X	X	X	X	X	X				
		Leachate 3		29-Feb-24	13:00	Leachate	X	X	X	X	X	X	X	X				
Drinking Water (DW) Samples (client use)		Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)			SAMPLE RECEIPT DETAILS (ALS use only)													
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		Dissolved metals samples have not been field filtered or preserved			Cooling Method: <input type="checkbox"/> NONE <input type="checkbox"/> ICE <input checked="" type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input type="checkbox"/> COOLING INITIATED													
Are samples for human consumption/ use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO					Submission Comments identified on Sample Receipt Notification: <input type="checkbox"/> YES <input type="checkbox"/> NO													
					Cooler Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> N/A Sample Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> N/A													
					INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C											
					6°C		6°C											
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)													
Released by: Connor Fraleigh		Date: Feb 29, 2024		Time: 4:35pm		Received by: RV		Date: 2/29		Time: 4:30pm								

Environmental Division
Vancouver
Work Order Reference
VA24A4191



Telephone : + 1 604 253 4188

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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.