March 3, 2025 Project: 24-065-01PG

British Columbia Oil and Gas Research and Innovation Society
PO Box 9331 Stn Prov Govt
Victoria, B.C. V8W 9N3
Attention: Brian Thomson

Re: British Columbia Energy Regulator – Peace Region 2024 Groundwater Sampling Program Results-V2

Western Water Associates Ltd. (WWAL) is pleased to provide this report documenting sampling methodologies and preliminary screening of groundwater quality data for the 2024 groundwater sampling program completed in the Peace Region on behalf of the British Columbia Oil and Gas Research and Innovation Society (BC OGRIS). The scope of work for this project was outlined in our proposal dated March 15, 2024 and submitted in response to a Request for Information (RFI) issued by the British Columbia Energy Regulator (BCER) on behalf of BC OGRIS.

1. BACKGROUND

A network of 29 groundwater monitoring wells is installed in the Peace Region of B.C. to characterize groundwater baseline chemistry, subsurface methane conditions, and groundwater levels, and to assess potential groundwater quality impacts associated with energy resource activity. The monitoring wells were installed in 2018 and 2019 as part of a collaborative project conducted by the University of British Columbia's Energy and Environment Research Initiative (EERI), Simon Fraser University, the BCER and Geoscience BC. The wells have been sampled several times between 2018 and 2021 with some wells being sampled more frequently than others.

In the spring of 2024, the BCER issued an RFI on behalf of BC OGRIS to conduct a groundwater sampling program of the monitoring well network. The objective of the 2024 sampling program was to assess geochemical changes in groundwater quality when compared to previously collected data. The RFI outlined sampling program requirements and specified a fixed budget to sample as many of the 29 wells as possible.

This report presents the results of the 2024 groundwater monitoring and sampling program.

2. SCOPE OF SERVICES

WWAL carried out the following tasks in completing the 2024 Peace Region groundwater sampling program.

1. Met with the BCER to refine sampling priorities and to determine a final list of wells for sampling. This list included 24 wells out of which 22 wells were sampled as 2 of the wells couldn't practicably be sampled and were therefore removed from the program in consultation with the BCER.
2. Completed a site-specific health and safety plan.

3. Conducted one groundwater monitoring and sampling event in August 2024 including measurement of groundwater levels and collection of groundwater samples from the selected monitoring wells.
4. Installed dataloggers purchased by the BCER in five wells selected by the BCER.
5. Submitted the 2024 groundwater quality data to the BCER for incorporation into the existing groundwater quality database.
6. Prepared this report outlining sampling methodologies and preliminary screening of the groundwater quality data.

3. METHODS AND PROCEDURES

Between August 13 and August 28, 2024, WWAL staff sampled 22 monitoring wells in the Peace Region of B.C. WWAL staff sampled in accordance with the BC Field Sampling Manual (ENV, 2013). The RFI indicated the BCER would assist with sampling of some of the more remote or difficult wells if needed. BCER staff assisted WWAL with sampling of monitoring wells EERI-4, EERI-14, and EERI-25.

Originally, the list of wells to be sampled included 24 wells; however, two wells (EERI-1 and EERI-5) were not sampled. EERI-1 is flowing artesian, and controls are installed in this well to prevent groundwater from flowing freely from it. WWAL visually assessed EERI-1 and determined that this well could not be practicably sampled, due to the artesian controls. EERI-5 was plumbed into a water system that included treatment. Any hose bibs or taps from which EERI-5 could have been sampled were located after treatment; therefore, it was also not sampled during the 2024 program as an untreated water quality sample could not be easily obtained.

Before sampling each well, WWAL staff measured the depth to the groundwater level in the well with respect to top of well casing with an electric water level sounder. The sounder was rinsed with deionized water between wells to reduce cross-contamination potential. Groundwater purging and sampling of 18 of the wells was completed using a Grundfos Redi-Flo2 submersible Pump. This pump was attached to approximately 90 m of HDPE tubing and an equivalent length of steel downrigger cable that acted as a safety line in case the tubing were to detach from the pump. When sampling, the pump was lowered into the wells from a metal hose reel and operated using a Grundfos frequency converter powered by a portable generator. Three wells (EERI-16, EERI-17 and EERI-25) were sampled with a smaller submersible pump powered by a 12V battery and operated without a controller. EERI-12 was purged and sampled using a bailer. To reduce cross-contamination potential, WWAL staff cleaned the pump and the attached tubing by pumping alconox solution followed by deionized water through the pump and tubing between each well.

During well purging, WWAL staff measured field parameters (pH, temperature, electrical conductivity, oxidation-reduction potential, and dissolved oxygen) with calibrated field instruments and collected samples when field parameters stabilized or three times the calculated well volume was purged from the wells and in the case of EERI-2 and EERI-26, after the wells had recovered a sufficient amount to collect a sample after going dry while purging.

WWAL submitted samples for chemical analyses of major and minor cations, trace metals, fluoride, chloride, nitrate, bicarbonate, phosphate, sulphate, ammonia, alkalinity, hardness, dissolved inorganic carbon, and total dissolved solids. WWAL also submitted samples for dissolved gasses including methane, ethane, propane, helium, oxygen, nitrogen, and carbon dioxide. These samples were additionally analyzed for isotopes including $\delta^{18}O$ and $\delta^{2}H$ of water, $\delta^{13}C$ and $\delta^{2}H$ of methane, $\delta^{13}C$ of carbon dioxide (on samples with sufficient concentration of methane), and $\delta^{13}C$ of dissolved inorganic carbon (DIC).

WWAL staff collected samples in laboratory supplied sample bottles, with field filtered samples collected for dissolved metals analysis using dedicated disposable 0.45-micron filters. Samples were preserved according to laboratory instructions. Dissolved gas samples were collected using the inverted bottle method in evacuated glass sampling bottles fitted with rubber seals. This methodology reduces the potential of atmospheric gases dissolving into the water sample. To collect dissolved gas samples, sample bottles were submerged upside down in a small bucket that was overflowing with incoming sample water. Dissolved gas sample bottles were filled by attaching syringe needles to the sample discharge line coming from the wells and puncturing the rubber seals on the sample bottles with the needles while the bottles remained underwater.

WWAL stored the collected samples in an ice-filled cooler and submitted them to ALS laboratory in Fort St. John with completed Chain-of-Custody forms. The dissolved gas and isotope samples were redirected to Isobrine Solutions by ALS for analyses.

In addition to sampling, WWAL installed water level transducers and barometric dataloggers in five wells selected by the BCER. WWAL utilized steel downrigger cable to secure the transducers and barometric dataloggers in the wells. Water level transducers were installed within the water column and barometric loggers were installed in the headspace of the wells near ground surface. Table 1 below summarizes transducer installation information.

Table 1: Water Level Transducer Installation Information

Well ID	Date Installed	Start Time	Recording Interval (hours)	Transducer Serial Number	Barometric Datalogger Serial Number
EERI-2	Aug 17, 2024	Aug 17, 2024 at 12:00	4	2192359	2194111
EERI-9	Aug 17, 2024	Aug 17, 2024 at 20:00	4	2192373	2194369
EERI-12	Aug 24, 2024	Aug 24, 2024 at 16:00	4	2192367	2194097
EERI-17	Aug 20, 2024	Aug 20, 2024 at 16:00	4	2192489	2192308
EERI-21	Aug 15, 2024	Aug 15, 2024 at 16:00	4	2192392	2194124

4. RESULTS

4.1 Groundwater Quality

The BCER provided historical water quality data to WWAL collected from the monitoring well network between 2018 and 2021. A summary table with the historical and 2024 sampling data is provided in Table A1 in Appendix A. Laboratory reports from the 2024 sampling are included in Appendix B.

Based on a preliminary screening comparison, water quality data collected from the monitoring wells in 2024 was overall similar to historical water quality results. Some dissolved metals, particularly dissolved aluminum, were elevated in samples collected in August 2021 when compared to other historically collected samples and 2024 water quality results.

Some notable differences between historical water quality results and 2024 water quality include:

- Nitrogen concentrations in the dissolved gas samples were higher in 2024 from EERI-17, EERI-19, EERI-20, EERI-21, EERI-22 and EERI-25 than in historical samples.
- Dissolved methane at EERI-9 was higher than in previously collected samples. Effervescence was observed in sampling materials during sample collection and methane concentrations have likely been skewed higher than actual.
- At EERI-20 dissolved potassium, sodium and strontium were lower and sulphur was higher when compared to previous water quality data.
- At EERI-24 dissolved arsenic was lower and dissolved silicone was higher in 2024 compared to historical water quality results.

Due to a laboratory error, phosphate analysis was completed beyond recommended sample hold times and phosphate analysis of EERI-6 was not completed by the laboratory due to insufficient sample volume being kept by the laboratory to complete the analysis beyond hold times.

4.2 Groundwater Elevations

The BCER provided groundwater levels recorded in 2019, 2020 as well as May or June 2024 to WWAL for comparison to groundwater levels measured in August 2024. Also provided were the surveyed elevations of the top of the well casings. Table 2 below summarizes groundwater levels and corresponding elevations measured historically and in August 2024.

Groundwater elevations in August 2024 ranged from 604.26 metres above sea level (m-asl) at EERI-17 to 790.8 m-asl at EERI-26. Aside from EERI-4, EERI-12, EERI-17, EERI-24, and EERI-26, groundwater elevations in August 2024 were similar to groundwater elevations measured in 2019 and 2020. EERI-4, EERI-12, EERI-17, EERI-24, and EERI-26 displayed larger groundwater fluctuations (up to ~39 m at EERI-24) between the three monitoring events. The groundwater level measurement made at EERI-3 in May 2024 appears to be erroneous as it is approximately ten times higher than during the remainder of the monitoring events.

Table 2: Groundwater Levels and Elevations for 2019, 2020 and 2024

Well ID	Top of Casing Elevation (m asl)	Groundwater Level (m-btoc)				Groundwater Elevation (m-asl)			
		2019	2020	May/June 2024	August 2024	2019	2020	May 2024	August 2024
EERI-1	704.12	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian
EERI-2	745.47	28.86	28.78	29.19	29.30	716.61	716.69	716.28	716.17
EERI-3	720.29	46.55	46.53	4.13	46.57	673.74	673.75	716.16	673.72
EERI-4	713.85	36.31	25.79	-	28.47	677.54	688.06	-	685.38
EERI-6	634.39	23.64	23.62	24.76	24.85	610.75	610.77	609.63	609.54
EERI-9	712.54	21.52	21.39	21.44	21.50	691.02	691.15	691.11	691.04
EERI-10	775.51	8.34	8.14	7.98	8.12	767.17	767.38	767.54	767.39
EERI-12	674.26	29.65	29.40	36.30	36.42	644.61	644.86	637.96	637.84
EERI-13	716.78	26.17	26.05	26.37	26.30	690.61	690.73	690.41	690.48
EERI-14	695.23	52.38	52.04	43.52	52.01	642.85	643.19	651.72	643.22
EERI-15	681.73	56.97	56.85	54.60	57.06	624.76	624.88	627.13	624.68
EERI-16	711.57	10.95	10.60	11.15	11.35	700.62	700.98	700.43	700.22
EERI-17	616.11	9.92	8.19	11.77	11.85	606.19	607.92	604.35	604.26
EERI-18A	731.40	3.73	3.35	3.75	4.07	727.67	728.05	727.66	727.33
EERI-19	712.15	38.41	38.34	38.33	38.43	673.74	673.81	673.82	673.72
EERI-20	731.68	9.67	9.80	11.06	11.08	722.01	721.88	720.62	720.60
EERI-21	671.79	65.91	65.76	65.46	65.89	605.88	606.03	606.34	605.90
EERI-22	706.18	17.38	17.15	17.63	17.73	688.80	689.03	688.55	688.45
EERI-23	686.37	22.65	22.42	23.02	23.07	663.72	663.95	663.35	663.30
EERI-24	765.73	55.96	17.44	26.41	24.77	709.77	748.29	739.31	740.96
EERI-25	671.63	9.71	9.62	9.91	9.99	661.92	662.01	661.71	661.64
EERI-26	797.47	4.77	4.73	6.42	6.71	792.70	792.74	791.05	790.76
EERI-28	697.89	44.15	43.95	-	44.11	653.74	653.94	-	653.79

Notes: m-btoc = metres below top of casing, m-asl = metres above sea level

4.3 Laboratory Qualifications

ALS is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. Accreditations are location and parameter specific. ALS subcontracted analysis of dissolved gas and isotope samples to Isobrine Solutions.

5. SUMMARY

In August 2024, WWAL sampled 22 wells in the Peace Region of B.C. on behalf of BCER. The sampled wells are part of a network consisting of 29 monitoring wells. Aside from a few wells, groundwater elevations in the monitoring wells in August 2024 were similar to groundwater elevations measured in 2019 and 2020. Overall, water quality data collected from the monitoring wells in 2024 was similar to groundwater quality in samples collected between 2018 and 2020. Resampling of wells with methane concentrations exceeding 20 ppm is recommended to confirm 2024 results.

6. CLOSURE

We trust that the professional opinions and advice presented in this document are sufficient for your current requirements. Should you have any questions, or if we can be of further assistance in this matter, please contact the undersigned.

WESTERN WATER ASSOCIATES LTD.
(EGBC Permit to Practice number 1001419)

Report by:

Lisa Gardiner, P.Eng.
Environmental Engineer

Chad Petersmeyer, P.Geo.
Senior Hydrogeologist

List of Attachments

Appendix A - Table A1: Groundwater Quality Summary Table
Appendix B - Laboratory Water Quality Reports

7. REFERENCES

BC Ministry of Environment and Climate Change Strategy (ENV). (2013). B.C. Field Sampling Manual. B.C. https://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/emre/bc_field_sampling_manual_complete.pdf

Western Water Associates Ltd.
Standard Report Limitations

1. This Document has been prepared for the particular purpose outlined in the work scope that has been mutually agreed to with the Client.
2. The scope and the period of service provided by Western Water Associates Ltd are subject to restrictions and limitations outlined in subsequent numbered limitations.
3. A complete assessment of all possible conditions or circumstances that may exist at the Site or within the Study Area referenced, has not been undertaken. Therefore, if a service is not expressly indicated, it has not been provided and if a matter is not addressed, no determination has been made by Western Water Associates Ltd. in regards to it.
4. Conditions may exist which were undetectable given the limited nature of the enquiry that Western Water Associates Ltd. was retained to undertake with respect to the assignment. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the Site, or Study Area, which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.
5. In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Western Water Associates Ltd's opinions are based upon information that existed at the time of the production of the Document. It is understood that the Services provided allowed Western Water Associates Ltd to form no more than an opinion of the actual conditions of the Site, or Study Area, at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the Site, or Study Area, nor the surroundings, or any laws or regulations.
6. Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either expressed or implied, that the actual conditions will conform exactly to the assessments contained in this Document.
7. Where data supplied by the Client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated.
8. No responsibility is accepted by Western Water Associates Ltd for incomplete or inaccurate data supplied by others.
9. The Client acknowledges that Western Water Associates Ltd may have retained sub-consultants affiliated to provide Services. Western Water Associates Ltd will be fully responsible to the Client for the Services and work done by all of its sub-consultants and subcontractors. The Client agrees that it will only assert claims against and seek to recover losses, damages or other liabilities from Western Water Associates Ltd.
10. This Document is provided for sole use by the Client and is confidential to it and its professional advisers. No responsibility whatsoever for the contents of this Document will be accepted to any person other than the Client. Any use which a third party makes of this Document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Western Water Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Document.

Appendix A

Groundwater Quality Summary Table

BC OGRIS 2024 Groundwater Sampling
WWAL Ref: 24-065-01PG

Table A1: Groundwater Quality Summary Table

Well ID		EERI-1A	EERI-1A	EERI-1A	EERI-1A	EERI-1B	EERI-1B	EERI-1B		EERI-2	EERI-2	EERI-2	EERI-2	EERI-2	EERI-2	EERI-3	EERI-3	EERI-3
Sample ID		**EERI_1A_1**	**EERI_1A_2**	**EERI_1A_3**	**EERI_1A_4**	**EERI_1B_1**	**EERI_1B_2**	**EERI_1B_3**	**EERI-1MM**	**EERI_2_1**	**EERI_2_2**	**EERI_2_3**	**EERI_2_4**	**EERI-2MM**	**EERI-2**	**EERI_3_1**	**EERI_3_2**	**EERI_3_3**
Date Sampled		4-Dec-2018	28-Jun-2019	27-Sep-2019	20-Jul-2020	28-Jun-2019	27-Sep-2019	20-Jul-2020	1-Aug-2021	4-Dec-2018	26-Jun-2019	1-Oct-2019	17-Jul-2020	1-Aug-2021	17-Aug-2024	28-Jun-2019	7-Oct-2019	24-Jul-2020
Analyte	**Units**																	
Field Results																		
Temperature	°C	5.2	6.3		5.7	6.1		5.6	6.6	7.6	10.2	10	11.5	12.8	12.7	8.5	6.1	8
pH		6.87	7.65		6.85	7.32		6.96	7.26	7.59	12.45	10.01	9.32	7.90		7.09	7.03	6.88
Conductivity	µS/cm	244	1074	940	929	1182	1020	1004	1301	348.5	4460	2070	1736	2977	1560	1647	1563	1373
Dissolved Oxygen	mg/L	0.82	0		0	0		1.13	0.55	0.53	7.79	0.53	0.18	0.64	2.96	0	0.48	0.36
Oxidation-Reduction Potential	mV	-161	-113.3		-45.9	10.8		-46.1		-193.9	129.8	82.1	-30.7		70	240.7	216.6	184
Eh	mV								134					75				
Lab Results																		
Physical Tests																		
Conductivity	µS/cm														1570			
Alkalinity (as HCO3)	mg/L	461	461	545	519	479	463	548	653	1271	335	880	1156	1657		643	672	706
Alkalinity, bicarbonate (as CaCO3)	mg/L														563			
Alkalinity, carbonate (as CaCO3)	mg/L														111			
Alkalinity, hydroxide (as CaCO3)	mg/L														<1.0			
Alkalinity, total (as CaCO3)	mg/L														674			
Hardness (as CaCO3), dissolved	mg/L														105			
Solids, total dissolved [TDS], calculated	mg/L														1320			
pH	pH units														9.10			
Anions and Nutrients																		
Ammonia (NH4)	mg/L				0			0.12					2.72					0.02
Ammonia, total (as N)	mg/L														4.89			
Bromide	mg/L	0.00	0.00	0.00		0.00	0.00			0.00	0.00	0.00				0.00	0.00	
Chloride	mg/L	1.76	1.75	1.79	0.36	1.46	1.23	0.48	0.94	12.03	12.28	13.34	4.68	17.03	6.72	0.64	1.07	0.55
Fluoride	mg/L	0.35	0.35	0.43	0.33	1.12	0.61	0.32	0.43	1.78	0.63	2.77		0.89	0.578	2.54	0.13	0.05
Nitrate (as NO3)	mg/L	1.84	1.56	1.32	2.44	1.74	2.00	2.14		4.60	0.00	3.58		11.09		2.15	2.04	2.70
Nitrate (as N)	mg/L														0.0576			
Nitrate + Nitrite (as N)	mg/L														0.0576			
Nitrite (as N)	mg/L														<0.0100			
Phosphate (as PO4)	mg/L	0.00	0.00	0.00	0.50	0.00	0.00			0.00	0.80	0.00			0.0566	0.00	0.83	0.82
Sulfate (as SO4)	mg/L	233	227	246	199	279	285	259	192	355	162	282	251	351	208	566	548	534
Organic / Inorganic Carbon																		
Carbon, dissolved inorganic [DIC]	mg/L														156			
Ion Balance																		
Anion sum	meq/L														18.0			
Cation sum	meq/L														30.7			
Ion balance (APHA)	%														26.1			
Ion balance (cations/anions)	%														170			
Dissolved Metals																		
Aluminum, dissolved	mg/L		0.005578	0.008897	0.002363	0.001836	0.009673	0.000822	1.651870		0.154313	0.062887	0.018648	11.548320	0.0068	0.007763	0.007124	0.003647
Antimony, dissolved	mg/L		0.000077	0.000053	0.000024	0.000026	0.000021	0.000017	0.000009		0.000461	0.000104	0.000020	0.000036	0.00021	0.000036	0.000016	0.000009
Arsenic, dissolved	mg/L		0.000334	0.000317	0.000519	0.001497	0.001576	0.000813	0.001360		0.001437	0.002601	0.003200	0.009753	0.00704	0.000126	0.000057	0.000087
Barium, dissolved	mg/L		0.024974	0.025000	0.016849	0.041762	0.045107	0.032456	0.017849		0.356318	0.104665	0.020970	0.057385	0.0546	0.014623	0.011467	0.010335
Beryllium, dissolved	mg/L		0.000007	0.000003	0.000017	0.000008	0.000002	0.000017			0.000003	0.000002	0.000034		<0.000040	0.000010	0.000001	0.000034
Bismuth, dissolved	mg/L		0.000000		0.000010	0.000000	0.000001	0.000009	0.000000		0.000023	0.000005	0.000006	0.000000	<0.000100	0.000008	0.000002	0.000006
Boron, dissolved	mg/L		0.08	0.08	0.11	0.09	0.09	0.11	0.12		0.11	0.32	0.52	1.50	0.699	0.13	0.12	0.17
Cadmium, dissolved	mg/L		0.000011	0.000007	0.000010	0.000010	0.000012	0.000011			0.000071	0.000038	0.000006		<0.0000100	0.000180	0.000113	0.000029
Calcium, dissolved	mg/L		118.28	112.85	113.68	130.82	127.53	121.07	123.07		166.21	10.54	3.18	61.16	24.7	139.33	125.44	119.65
Cesium, dissolved	mg/L		0.000020	0.000030	0.000001	0.000060	0.000085	0.000001	0.000005		0.000099	0.000024	0.000006	0.000141	0.000035	0.000063	0.000019	0.000010
Chromium, dissolved	mg/L		0.000245	0.000221	0.000249	0.000032	0.000088	0.000195	0.001140		0.017084	0.004351	0.002216	0.006010	<0.00100	0.002315	0.001973	0.002350
Cobalt, dissolved	mg/L		0.000037	0.000032	0.000545	0.001692	0.001832	0.000890	0.000699		0.000121	0.000162	0.000111	0.000464	0.00027	0.000221	0.000182	0.000101
Copper, dissolved	mg/L		0.000002	0.000000	0.000051	0.000000	0.000168	0.000051	0.000000		0.003472	0.000830	0.000689	0.000000	<0.00040	0.000999	0.000547	0.000103
Iron, dissolved	mg/L		0.02	0.02	0.02	2.49	2.76	0.00	1.71		0.03	0.03	0.01	1.03	0.094	0.03	0.04	0.01
Lead, dissolved	mg/L		0.000016	0.000031	0.000023	0.000014	0.000054	0.000017	0.000004		0.000859	0.000090	0.000043	0.000041	<0.000100	0.000176	0.000048	0.000021
Lithium, dissolved	mg/L		0.015791	0.015129	0.017713	0.016693	0.017519	0.019667	0.017869		0.083197	0.102191	0.150774	0.365516	0.184	0.007650	0.007619	0.009237
Magnesium, dissolved	mg/L		55.58	56.46	67.12	58.19	59.31	67.74	60.54		0.02	7.26	10.11	27.90	10.6	99.86	91.29	95.70
Manganese, dissolved	mg/L		0.56	0.62	0.37	1.20	1.19	0.78	0.28		0.00	0.09	0.00	0.21	0.0264	0.31	0.49	0.16

Table A1: Groundwater Quality Summary Table

Well ID		EERI-1A	EERI-1A	EERI-1A	EERI-1A	EERI-1B	EERI-1B	EERI-1B		EERI-2	EERI-2	EERI-2	EERI-2	EERI-2	EERI-2	EERI-3	EERI-3	EERI-3
Sample ID		**EERI_1A_1**	**EERI_1A_2**	**EERI_1A_3**	**EERI_1A_4**	**EERI_1B_1**	**EERI_1B_2**	**EERI_1B_3**	**EERI-1MM**	**EERI_2_1**	**EERI_2_2**	**EERI_2_3**	**EERI_2_4**	**EERI-2MM**	**EERI-2**	**EERI_3_1**	**EERI_3_2**	**EERI_3_3**
Date Sampled		4-Dec-2018	28-Jun-2019	27-Sep-2019	20-Jul-2020	28-Jun-2019	27-Sep-2019	20-Jul-2020	1-Aug-2021	4-Dec-2018	26-Jun-2019	1-Oct-2019	17-Jul-2020	1-Aug-2021	17-Aug-2024	28-Jun-2019	7-Oct-2019	24-Jul-2020
Mercury, dissolved	mg/L														<0.0000050			
Molybdenum, dissolved	mg/L		0.000038	0.000016	0.000434	0.001273	0.001140	0.000461	0.000390		0.024831	0.013017	0.008152	0.004986	0.00468	0.000432	0.000326	0.000296
Nickel, dissolved	mg/L		0.000681	0.000351	0.000478	0.001613	0.001764	0.000784	0.001647		0.002462	0.002046	0.001232	0.001029	0.00307	0.002324	0.001380	0.001363
Phosphorus, dissolved	mg/L														0.327			
Potassium, dissolved	mg/L		3.88	3.92	3.26	4.14	4.17	3.33	3.42		30.67	13.96	7.66	8.60	4.19	3.02	2.88	2.68
Rubidium, dissolved	mg/L								0.000643					0.007063	0.00324			
Selenium, dissolved	mg/L		0.000044	0.000032	0.000087	0.000043	0.000042	0.000112			0.000531	0.000148	0.000212		<0.000100	0.000515	0.000391	0.000485
Silicon, dissolved	mg/L		4.91	4.67	5.05	5.63	5.45	5.32	5.61		1.33	2.48	2.40	6.40	3.68	4.23	3.97	4.18
Silver, dissolved	mg/L														<0.000020			
Sodium, dissolved	mg/L		68.14	68.22	66.96	76.93	75.15	73.62	66.80		280.18	470.20	572.39	1358.02	646	159.28	160.94	179.28
Strontium, dissolved	mg/L		0.45	0.44	0.51	0.55	0.56	0.56	0.63		1.71	0.22	0.17	1.08	0.421	0.79	0.73	0.78
Sulfur, dissolved	mg/L		55.67	61.41	60.37	73.00	75.61	73.73	70.13		45.00	69.93	75.91	236.35	111	154.31	151.18	151.28
Tellurium, dissolved	mg/L														<0.00040			
Thallium, dissolved	mg/L		0.000009	0.000000	0.000012	0.000009	0.000002	0.000013			0.000003	0.000003	0.000005	0.000000	<0.000020	0.000033	0.000015	0.000005
Thorium, dissolved	mg/L		0.000002	0.000002	0.000010	0.000001	0.000003	0.000009			0.000006	0.000002	0.000002		<0.00020	0.000003	0.000001	0.000002
Tin, dissolved	mg/L		0.000664	0.000601	0.000040	0.000003	0.000011	0.000021			0.002621	0.000994	0.000309		<0.00020	0.000118	0.000073	0.000069
Titanium, dissolved	mg/L		0.000340	0.000301	0.000540	0.000286	0.000390	0.000093			0.000319	0.000343	0.000177		<0.00060	0.000163	0.000357	0.000204
Tungsten, dissolved	mg/L														0.00033			
Uranium, dissolved	mg/L		0.003168	0.003155	0.003764	0.004854	0.004767	0.003220	0.004743		0.000019	0.001519	0.000932	0.001762	0.00103	0.006505	0.005673	0.004098
Vanadium, dissolved	mg/L		0.000424	0.000391	0.000012	0.000060	0.000078	0.000009	0.000009		0.001743	0.000825	0.000097	0.000125	0.00277	0.000414	0.000260	0.000160
Zinc, dissolved	mg/L		0.000302	0.001841	0.000316	0.000267	0.003591	0.000568	0.003401		0.004940	0.003877	0.000365	0.012521	0.0040	0.003317	0.013204	0.011223
Zirconium, dissolved	mg/L		0.000211	0.000210	0.000015	0.000163	0.000152	0.000017	0.000030		0.000037	0.001254	0.000518	0.002797	<0.00180	0.000051	0.000029	0.000032
Isotopes																		
$d^{13}C$ - DIC	‰ VPDB														-16.2			
$d^{2}H$	‰ VSMOW								-168.6					-167.7	-174.7			
$d^{18}O$	‰ VSMOW								-21.5					-21.3	-22.2			
$\delta^{13}C_{CO2}$	‰ VPDB				-20.5			-21.0							-24.6			-20.2
$\delta^{13}C_{CH4}$	‰ VPDB												-74.2		-42.4			
$\delta^{2}H_{CH4}$	‰ VSMOW														-221.1			
Dissolved Gases																		
CH_4	ppm		0.033	0.057	0.005	0.058	0.010	0.004			0.033	0.027	0.040		0.012	0.001	0.006	0.001
C_2H_6	ppm		0.0012	0.0079	0.0006	0.0027	0.0033	0.0003			0.0018	0.0030	0.0021		-	0.0003	0.0006	0.0000
C_3H_8	ppm		0.0004	0.0021	0.0004	0.0008	0.0008	0.0000			0.0002	0.0004	0.0000		-	0.0000	0.0000	0.0000
He	ppm or %v/v for 2024 results														<0.01			
O_2	ppm		0.32	2.78	1.90	3.10	2.16	1.80			0.93	0.72	1.05		21.60	52.09	5.66	2.81
N_2	ppm		6.77	106.12	29.34	30.41	33.07	29.40			8.31	22.72	18.97		402.37	181.31	38.59	26.57
CO_2	ppm		40.71	59.41	67.90	52.72	53.99	55.43			0.00	1.15	1.24		31.54	108.72	102.27	104.82

1-EERI 9 dissolved gas concentrations are likely overestimated due to effervescence during sampling.
(-) below detection limit for isotopes and dissolved gases
n/a headpsace not present in sample and therefore He not analyzed

Table A1: Groundwater Quality Summary Table

Well ID		EERI-3	EERI-3	EERI-4A	EERI-4A	EERI-4A	EERI-4	EERI-4	EERI-4	EERI-5	EERI-5	EERI-5	EERI-6	EERI-6	EERI-6	EERI-6	EERI-6	EERI-7
Sample ID		**EERI-3MM**	**EERI-3**	**EERI_4A_1**	**EERI_4A_2**	**EERI_4A_3**	**EERI_4B_1**	**EERI_4B_2**	**EERI-4**	**EERI_5_1**	**EERI_5_2**	**EERI_5_3**	**EERI_6_1**	**EERI_6_2**	**EERI_6_3**	**EERI-6MM**	**EERI-6**	**EERI_7_1**
Date Sampled		1-Aug-2021	26-Aug-2024	5-Dec-2018	5-Oct-2019	26-Jul-2020	??	26-Jul-2020	22-Aug-2024	7-Jul-2019	5-Oct-2019	26-Jul-2020	27-Jun-2019	4-Oct-2019	25-Jul-2020	1-Aug-2021	13-Aug-2024	26-Jun-2019
Analyte	**Units**																	
Field Results																		
Temperature	°C	10	7.4	0.4					11.6	8.9	7.2	8	8.4	8.1	9.5	8.8	12.1	9
pH		7.15	7.25	7.45					7.86	7.10	7.01	6.78	7.97	7.85	7.53	6.60	8.02	6.94
Conductivity	µS/cm	1988	1712	294	3220	n/a		n/a	3720	2311	3542	2130	1318	1134	1007	1208	1044	1979
Dissolved Oxygen	mg/L	0.42	1.03	7.67					1.09	0	0.97	0.29	0.58	0.25	0.17	0.14	1.27	0
Oxidation-Reduction Potential	mV		20	-149					-112	-61.8	100.2	173.1	165.4	50.9	243.5		-105	150.6
Eh	mV	271														-10		
Lab Results																		
Physical Tests																		
Conductivity	µS/cm		1880						3660								1160	
Alkalinity (as HCO3)	mg/L	773		531	2703	2768	434	1309		1661	2097	1594	977	812	822	923		285
Alkalinity, bicarbonate (as CaCO3)	mg/L		640						2120								742	
Alkalinity, carbonate (as CaCO3)	mg/L		<1.0						138								<1.0	
Alkalinity, hydroxide (as CaCO3)	mg/L		<1.0						<1.0								<1.0	
Alkalinity, total (as CaCO3)	mg/L		640						2260								742	
Hardness (as CaCO3), dissolved	mg/L		680						106								251	
Solids, total dissolved [TDS], calculated	mg/L		1280						2540								747	
pH	pH units		7.35						8.61								8.18	
Anions and Nutrients																		
Ammonia (NH4)	mg/L					0.01		0.58				0.34			1.08			
Ammonia, total (as N)	mg/L		0.0509						1.32								1.40	
Bromide	mg/L			0.00	3.72	0.00	0.11			0.00	3.09	0.23	0.00	0.00				0.00
Chloride	mg/L	1.82	<5.00	21.40	24.09	23.09	9.77	8.12	29.1	29.91	391.48	29.61	11.04	4.13	0.55	1.60	<2.50	1.09
Fluoride	mg/L		<0.200	1.24	1.24	0.89	0.38	0.59	0.595	5.32	2.46	1.13	1.05	1.73	0.88	2.25	0.962	2.05
Nitrate (as NO3)	mg/L	7.25		1.84	4.11	5.56	0.50	6.66		5.67	9.49	6.73	4.23	3.46	4.21	7.19		0.65
Nitrate (as N)	mg/L		<0.0500						<0.100								<0.0250	
Nitrate + Nitrite (as N)	mg/L		<0.0510						<0.102								<0.0255	
Nitrite (as N)	mg/L		<0.0100						<0.0200								<0.0050	
Phosphate (as PO4)	mg/L		<0.0010	0.00	0.00		0.00		<0.0010	0.00	0.00		0.00	0.00				0.00
Sulfate (as SO4)	mg/L	581	478	235	65	98	1173	593	81.3	198	309	255	11	4	7	8	<1.50	1380
Organic / Inorganic Carbon																		
Carbon, dissolved inorganic [DIC]	mg/L		160						590								186	
Ion Balance																		
Anion sum	meq/L		22.7						47.7								14.9	
Cation sum	meq/L		21.9						46.7								14.1	
Ion balance (APHA)	%		-1.79						-1.06								-2.76	
Ion balance (cations/anions)	%		96.5						97.9								94.6	
Dissolved Metals																		
Aluminum, dissolved	mg/L	9.316250	0.0016		0.018648			0.010278	0.0083	0.028149	0.016407	0.010761	0.008330	0.001551	0.007195	4.971800	<0.0010	0.008045
Antimony, dissolved	mg/L	0.000045	<0.00010		0.000807			0.000059	<0.00050	0.000139	0.000041	0.000017	0.000772	0.000012	0.000010	0.000026	<0.00010	0.000112
Arsenic, dissolved	mg/L		<0.00010		0.000717			0.001274	0.00296	0.000195	0.000093	0.000108	0.000323	0.000056	0.000081	0.001687	0.00050	0.000509
Barium, dissolved	mg/L	0.031198	0.00876		3.297284			0.145071	3.20	0.346473	1.185988	0.107804	3.994851	4.484648	4.083204	10.057391	4.52	0.014031
Beryllium, dissolved	mg/L		<0.000020		0.000002			0.000068	<0.000100	0.000031	0.000007	0.000068	0.000001	0.000001	0.000034		<0.000020	0.000004
Bismuth, dissolved	mg/L	0.000004	<0.000050		0.000023			0.000012	<0.000250	0.000021	0.000015	0.000012	0.000007		0.000006	0.000005	<0.000050	0.000007
Boron, dissolved	mg/L	0.42	0.169		0.46			0.34	0.473	0.60	0.56	0.67	0.25	0.20	0.22	0.47	0.217	0.12
Cadmium, dissolved	mg/L	0.000110	0.0000584		0.000047			0.000007	<0.0000250	0.000057	0.000031	0.000007	0.000008	0.000002	0.000004		<0.0000050	0.000040
Calcium, dissolved	mg/L	337.94	119		16.92			146.49	23.0	54.55	57.89	72.60	17.01	51.20	51.69	97.36	46.6	378.96
Cesium, dissolved	mg/L	0.000015	<0.000010		0.000053			0.000142	0.000054	0.000101	0.000059	0.000009	0.000029	0.000003	0.000008	0.000104	0.000045	0.000064
Chromium, dissolved	mg/L	0.007577	0.00100		0.004878			0.004431	<0.00250	0.005361	0.004779	0.005331	0.001677	0.000052	0.002587	0.004680	<0.00050	0.001732
Cobalt, dissolved	mg/L	0.000727	0.00022		0.000561			0.003096	0.00109	0.000176	0.000029	0.000041	0.000196	0.000032	0.000031	0.000132	<0.00010	0.001032
Copper, dissolved	mg/L	0.000810	<0.00020		0.001723			0.000729	<0.00100	0.006046	0.000933	0.000206	0.004373	0.000112	0.000103	0.000327	<0.00020	0.000615
Iron, dissolved	mg/L	0.05	0.013		0.05			1.98	1.04	3.38	1.47	6.81	0.05	3.90	3.95	8.61	1.85	0.49
Lead, dissolved	mg/L	0.000093	<0.000050		0.000545			0.000072	<0.000250	0.000440	0.000319	0.000054	0.000130	0.000005	0.000030	0.000065	<0.000050	0.000129
Lithium, dissolved	mg/L	0.017842	0.0092		1.724315			0.794259	1.72	0.716990	1.390799	0.736409	0.542763	0.302094	0.268266	0.538273	0.256	0.097688
Magnesium, dissolved	mg/L	237.12	93.1		8.72			49.24	11.9	44.78	43.65	59.06	10.56	29.39	31.20	59.07	32.6	94.37
Manganese, dissolved	mg/L	0.20	0.0812		0.06			2.13	0.185	0.11	0.08	0.18	0.03	0.21	0.22	0.42	0.200	0.12

Table A1: Groundwater Quality Summary Table

Well ID		EERI-3	EERI-3	EERI-4A	EERI-4A	EERI-4A	EERI-4	EERI-4	EERI-4	EERI-5	EERI-5	EERI-5	EERI-6	EERI-6	EERI-6	EERI-6	EERI-6	EERI-7
Sample ID		**EERI-3MM**	**EERI-3**	**EERI_4A_1**	**EERI_4A_2**	**EERI_4A_3**	**EERI_4B_1**	**EERI_4B_2**	**EERI-4**	**EERI_5_1**	**EERI_5_2**	**EERI_5_3**	**EERI_6_1**	**EERI_6_2**	**EERI_6_3**	**EERI-6MM**	**EERI-6**	**EERI_7_1**
Date Sampled		1-Aug-2021	26-Aug-2024	5-Dec-2018	5-Oct-2019	26-Jul-2020	??	26-Jul-2020	22-Aug-2024	7-Jul-2019	5-Oct-2019	26-Jul-2020	27-Jun-2019	4-Oct-2019	25-Jul-2020	1-Aug-2021	13-Aug-2024	26-Jun-2019
Mercury, dissolved	mg/L		<0.0000050						<0.0000050								<0.0000050	
Molybdenum, dissolved	mg/L	0.001073	0.00130		0.007296			0.005502	0.00605	0.000484	0.000131	0.000092	0.001325	0.000344	0.000376	0.002294	0.000565	0.000822
Nickel, dissolved	mg/L	0.006440	0.00365		0.003339			0.003854	0.00901	0.002297	0.001582	0.000944	0.001548	0.000253	0.000534	0.000213	<0.00050	0.002522
Phosphorus, dissolved	mg/L		<0.050						<0.250								<0.050	
Potassium, dissolved	mg/L	7.52	2.93		3.91			4.41	3.43	3.18	3.46	2.96	2.21	2.75	2.39	5.26	2.73	4.81
Rubidium, dissolved	mg/L	0.000988	0.00047						0.00296							0.005422	0.00288	
Selenium, dissolved	mg/L	0.001643	0.00105		0.000199			0.000324	<0.000250	0.000229	0.000142	0.000125	0.000226	0.000020	0.000087		<0.000050	0.000844
Silicon, dissolved	mg/L	11.79	5.18		3.01			5.39	5.91	3.38	3.37	3.77	2.71	3.09	3.39	7.62	4.36	4.70
Silver, dissolved	mg/L		<0.000010						<0.000050								<0.000010	
Sodium, dissolved	mg/L	411.98	190		1055.49			531.84	1020	559.26	935.05	492.70	343.31	207.67	193.95	379.84	203	26.32
Strontium, dissolved	mg/L	2.26	0.724		0.77			0.36	0.932	0.88	1.11	0.90	0.81	1.61	1.61	3.48	1.68	0.31
Sulfur, dissolved	mg/L	456.66	169		19.77			187.10	31.4	55.15	66.31	91.84	3.83	1.17	1.90	0.75	<0.50	287.55
Tellurium, dissolved	mg/L		<0.00020						<0.00100								<0.00020	
Thallium, dissolved	mg/L		<0.000010		0.000006			0.000009	<0.000050	0.000038	0.000009	0.000009	0.000001	0.000000	0.000005		<0.000010	0.000015
Thorium, dissolved	mg/L		<0.00010		0.000005			0.000005	<0.00050	0.000009	0.000004	0.000005	0.000003	0.000001	0.000002		<0.00010	0.000004
Tin, dissolved	mg/L		<0.00010		0.000391			0.000209	<0.00050	0.000335	0.000283	0.000224	0.000109	0.000002	0.000077		<0.00010	0.000113
Titanium, dissolved	mg/L		<0.00030		0.001042			0.000354	<0.00150	0.000575	0.000534	0.000266	0.000369	0.000058	0.000239		<0.00030	0.000444
Tungsten, dissolved	mg/L		0.00033						0.00739								0.00023	
Uranium, dissolved	mg/L	0.013878	0.00576		0.004060			0.009660	0.00436	0.000163	0.000021	0.000005	0.000834	0.000005	0.000003	0.000028	<0.000010	0.004826
Vanadium, dissolved	mg/L	0.000343	<0.00050		0.001149			0.000358	<0.00250	0.000142	0.000132	0.000144	0.000127	0.000013	0.000034	0.000043	<0.00050	0.000057
Zinc, dissolved	mg/L	0.051360	0.0019		1.515192			7.904872	<0.0050	0.008044	0.016460	0.007088	0.003274	0.002687	0.003753	0.007147	0.0020	0.008580
Zirconium, dissolved	mg/L	0.000090	<0.00030		0.017411			0.000355	0.0102	0.003439	0.011397	0.002677	0.000762	0.000066	0.000079	0.000242	<0.00030	0.000046
Isotopes																		
$d^{13}C$ - DIC	‰ VPDB		-9.0						-7.7								-15.8	
$d^{2}H$	‰ VSMOW	-171.1	-175.2						-187.5							-173.0	-176.2	
$d^{18}O$	‰ VSMOW	-21.8	-22.6						-24.1							-22.1	-22.6	
$\delta^{13}C_{CO2}$	‰ VPDB		-16.7						-16.2			-28.2			-26.9		-23.7	
$\delta^{13}C_{CH4}$	‰ VPDB		-						-59.1			-77.7			-65.3		-69.1	
$\delta^{2}H_{CH4}$	‰ VSMOW		-						-414.4								-274.2	
Dissolved Gases																		
CH_4	ppm		0.012						8.693	6.514	4.911	3.986	25.479	10.441	3.827		3.157	0.011
C_2H_6	ppm		-						0.0053	0.0113	0.0081	0.0000	0.0376	0.0149	0.0000		0.0097	0.0012
C_3H_8	ppm		-						0.0074	0.0014	0.0013	0.0008	0.0628	0.0051	0.0037		0.0169	0.0004
He	ppm or %v/v for 2024 results		<0.01						N/A								N/A	
O_2	ppm		20.89						0.60	2.46	1.35	1.31	3.00	0.95	1.24		1.01	2.93
N_2	ppm		653.14						31.72	27.17	25.32	24.48	36.19	24.70	24.81		25.25	32.02
CO_2	ppm		87.84						51.74	306.29	243.80	299.28	26.84	19.64	27.93		21.72	72.43

1-EERI 9 dissolved gas concentrations are likely overestimated due to effervescence during sampling.
(-) below detection limit for isotopes and dissolved gases
n/a headpsace not present in sample and therefore He not analyzed

Table A1: Groundwater Quality Summary Table

Well ID		EERI-7	EERI-7	EERI-7	EERI-8	EERI-8	EERI-8	EERI-9	EERI-9	EERI-9	EERI-9	EERI-9	EERI-10	EERI-10	EERI-10	EERI-10	EERI-10	EERI-10
Sample ID		**EERI_7_2**	**EERI_7_3**	**EERI-7MM**	**EERI_8_1**	**EERI_8_2**	**EERI_8_3**	**EERI_9_1**	**EERI_9_2**	**EERI_9_3**	**EERI-9MM**	**EERI-9**	**EERI_10_1**	**EERI_10_2**	**EERI_10_3**	**EERI_10MM**	**EERI-10MM**	**EERI-10**
Date Sampled		1-Oct-2019	17-Jul-2020	1-Aug-2021	8-Jul-2019	30-Sep-2019	19-Jul-2020	10-Jul-2019	3-Oct-2019	18-Jul-2020	1-Aug-2021	17-Aug-2024	8-Jul-2019	3-Oct-2019	18-Jul-2020	1-Aug-2021	1-Aug-2021	17-Aug-2024
Analyte	**Units**																	
Field Results																		
Temperature	°C	6.5	7.3	7.2	6.3			7.7	7.3	8.5	8.5	10.5	7.4	7.1	8.5	12.7	12.7	9.9
pH		6.73	6.69	6.90	7.72			5.77	6.41	7.71	6.41		8.22	7.93	7.71		7.70	
Conductivity	µS/cm	2051	1773	2478	2238	1640	n/a	5750	4620	4740	5438	4800	4820	3908	3850	4525	4525	4090
Dissolved Oxygen	mg/L	0.7	0.35	1.19				0.2	0.52	0		1.69	0	0.3	0		0.75	0.75
Oxidation-Reduction Potential	mV	83.9	28.8		262.1			-85.9	97.5	-39.7		-53	208.6	102.2	-39.7			-46
Eh	mV			224							137						41	
Lab Results																		
Physical Tests																		
Conductivity	µS/cm											5400						4330
Alkalinity (as HCO3)	mg/L	246	317	296	480	643	880	994	1171	1282	1394		1628	1681	1769		1724	
Alkalinity, bicarbonate (as CaCO3)	mg/L											1100						1400
Alkalinity, carbonate (as CaCO3)	mg/L											<1.0						55.0
Alkalinity, hydroxide (as CaCO3)	mg/L											<1.0						<1.0
Alkalinity, total (as CaCO3)	mg/L											1100						1460
Hardness (as CaCO3), dissolved	mg/L											3700						148
Solids, total dissolved [TDS], calculated	mg/L											5330						3070
pH	pH units											6.82						8.48
Anions and Nutrients																		
Ammonia (NH4)	mg/L		0.1				0.17			1.12					2			
Ammonia, total (as N)	mg/L											2.56						3.93
Bromide	mg/L	0.00			0.00	0.00	0.00	0.00	0.14				0.00	0.00				
Chloride	mg/L	0.65	0.17	0.87	11.76	1.78	2.32	12.66	9.70	4.42	19.11	<10.0	10.55	11.27	5.09		18.74	<10.0
Fluoride	mg/L	2.96	1.25		0.45	0.61	0.29	9.73	2.46	1.03		0.995	4.43	2.11	0.60			0.424
Nitrate (as NO3)	mg/L	0.00	0.13	5.69	1.46	1.78	1.17	0.83	0.00		14.77		4.34	0.00	0.67		10.21	
Nitrate (as N)	mg/L											<0.100						<0.100
Nitrate + Nitrite (as N)	mg/L											<0.102						<0.102
Nitrite (as N)	mg/L											<0.0200						<0.0200
Phosphate (as PO4)	mg/L	4.00	1.44		0.00	0.00	11.20	0.00	0.00	1.79		<0.0010	0.00	0.00				<0.0010
Sulfate (as SO4)	mg/L	1459	1333	1471	531	593	604	3408	3372	3307	3355	3250	1248	1361	1268		993	1060
Organic / Inorganic Carbon																		
Carbon, dissolved inorganic [DIC]	mg/L											322						372
Ion Balance																		
Anion sum	meq/L											89.7						51.3
Cation sum	meq/L											86.6						49.9
Ion balance (APHA)	%											-1.76						-1.38
Ion balance (cations/anions)	%											96.5						97.3
Dissolved Metals																		
Aluminum, dissolved	mg/L	0.006858	0.003583	23.403500	0.025065	0.008322		0.046732	0.028690	0.007812	58.126800	0.0111	0.059813	0.019092	0.008112		23.238500	0.0073
Antimony, dissolved	mg/L	0.000044	0.000018	0.000120	0.002027	0.001444		0.000258	0.000103	0.000038	0.000064	<0.00050	0.020276	0.001524	0.000416		0.000707	<0.00050
Arsenic, dissolved	mg/L	0.001091	0.000169	0.006541	0.001164	0.000472		0.001463	0.002529	0.000364	0.013376	0.00483	0.017470	0.007933	0.001826		0.002412	0.00066
Barium, dissolved	mg/L	0.007082	0.005474	0.035121	0.080726	0.024428		0.018097	0.012092	0.005422	0.023641	0.00560	0.018610	0.013748	0.008307		0.016908	0.00747
Beryllium, dissolved	mg/L	0.000007	0.000034		0.000017	0.000005		0.000012	0.000007	0.000085		<0.000100	0.000004	0.000004	0.000085			<0.000100
Bismuth, dissolved	mg/L	0.000005	0.000006	0.000008	0.000020	0.000011		0.000036	0.000018	0.000024	0.000001	<0.000250	0.000032	0.000011	0.000015		0.000008	<0.000250
Boron, dissolved	mg/L	0.11	0.17	0.82	0.26	0.27		0.39	0.37	0.52	1.75	0.558	0.53	0.53	0.65		1.20	0.748
Cadmium, dissolved	mg/L	0.000014	0.000005		0.000084	0.000331		0.000117	0.000017	0.000027		<0.0000250	0.000088	0.000029	0.000009			<0.0000250
Calcium, dissolved	mg/L	406.26	385.97	2135.55	118.24	112.40		531.27	506.13	478.81	1722.60	516	15.97	17.43	16.28		66.09	22.4
Cesium, dissolved	mg/L	0.000056	0.000005	0.000038	0.000040	0.000022		0.000179	0.000134	0.000014	0.000085	<0.000050	0.000140	0.000121	0.000009		0.000269	0.000148
Chromium, dissolved	mg/L	0.001638	0.002223	0.013909	0.001579	0.001672		0.007333	0.006662	0.006491	0.031712	<0.00250	0.007210	0.005005	0.005927		0.013896	<0.00250
Cobalt, dissolved	mg/L	0.001010	0.000610	0.006198	0.002159	0.000220		0.023073	0.025464	0.022195	0.102645	0.0293	0.000163	0.000161	0.000052			<0.00050
Copper, dissolved	mg/L	0.000869	0.000436	0.000865	0.002646	0.003324		0.002962	0.001440	0.000647	0.000893	<0.00100	0.003210	0.001353	0.000748		0.000466	<0.00100
Iron, dissolved	mg/L	2.05	0.01	13.60	0.07	0.04		11.10	22.05	0.04	63.63	18.4	0.07	0.19	0.01		0.28	0.372
Lead, dissolved	mg/L	0.000103	0.000044	0.000158	0.000554	0.000420		0.000528	0.000314	0.000103	0.000078	<0.000250	0.000536	0.000229	0.000096		0.000063	<0.000250
Lithium, dissolved	mg/L	0.092691	0.137579	0.621722	0.015530	0.017044		0.194184	0.177022	0.264376	0.872585	0.286	0.427130	0.408092	0.476818		0.872296	0.537
Magnesium, dissolved	mg/L	105.20	139.43	547.06	46.21	44.71		520.47	524.14	609.54	1893.96	585	19.49	23.74	23.25		36.89	22.3
Manganese, dissolved	mg/L	0.14	0.13	0.56	0.14	0.00		2.51	2.40	2.38	7.57	2.26	0.02	0.06	0.02		0.02	0.0103

Table A1: Groundwater Quality Summary Table

Well ID		EERI-7	EERI-7	EERI-7	EERI-8	EERI-8	EERI-8	EERI-9	EERI-9	EERI-9	EERI-9	EERI-9	EERI-10	EERI-10	EERI-10	EERI-10	EERI-10	EERI-10
Sample ID		**EERI_7_2**	**EERI_7_3**	**EERI-7MM**	**EERI_8_1**	**EERI_8_2**	**EERI_8_3**	**EERI_9_1**	**EERI_9_2**	**EERI_9_3**	**EERI-9MM**	**EERI-9**	**EERI_10_1**	**EERI_10_2**	**EERI_10_3**	**EERI_10MM**	**EERI-10MM**	**EERI-10**
Date Sampled		1-Oct-2019	17-Jul-2020	1-Aug-2021	8-Jul-2019	30-Sep-2019	19-Jul-2020	10-Jul-2019	3-Oct-2019	18-Jul-2020	1-Aug-2021	17-Aug-2024	8-Jul-2019	3-Oct-2019	18-Jul-2020	1-Aug-2021	1-Aug-2021	17-Aug-2024
Mercury, dissolved	mg/L											<0.0000050						<0.0000050
Molybdenum, dissolved	mg/L	0.000498	0.000376	0.001908	0.013255	0.019189		0.002702	0.001742	0.000744	0.003791	0.00119	0.034080	0.005027	0.000969		0.003291	0.000839
Nickel, dissolved	mg/L	0.002618	0.001864	0.028227	0.012687	0.015268		0.025669	0.026415	0.026786	0.110613	0.0273	0.002465	0.001811	0.001920		0.000769	<0.00250
Phosphorus, dissolved	mg/L											<0.250						<0.250
Potassium, dissolved	mg/L	4.94	4.91	26.08	13.45	5.69		8.28	7.68	6.35	24.63	7.77	5.32	5.36	4.57		11.03	5.07
Rubidium, dissolved	mg/L			0.008149							0.014538	0.00475					0.010810	0.00450
Selenium, dissolved	mg/L	0.001282	0.001755	0.009280	0.001597	0.000989		0.000708	0.000327	0.000529		<0.000250	0.006397	0.000281	0.000373			<0.000250
Silicon, dissolved	mg/L	5.05	5.11	29.15	3.34	2.76		9.14	7.24	6.06	22.76	9.28	4.06	2.82	2.19		4.02	2.81
Silver, dissolved	mg/L											<0.000050						<0.000050
Sodium, dissolved	mg/L	25.10	25.74	128.44	264.16	305.29		245.90	241.50	252.46	897.49	266	1087.36	1112.47	1106.98		1888.64	1070
Strontium, dissolved	mg/L	0.28	0.34	1.66	1.66	1.36		0.86	0.84	0.70	2.69	0.774	0.55	0.73	0.76		1.70	0.857
Sulfur, dissolved	mg/L	319.51	332.69	2188.43	138.50	150.64		774.73	810.94	874.48	3743.50	1190	340.29	354.67	333.32		713.58	382
Tellurium, dissolved	mg/L											<0.00100						<0.00100
Thallium, dissolved	mg/L	0.000017	0.000007	0.000042	0.000133	0.000054		0.000088	0.000005	0.000028		<0.000050	0.000009	0.000001	0.000012			<0.000050
Thorium, dissolved	mg/L	0.000002	0.000004		0.000003	0.000002		0.000012	0.000006	0.000019		<0.00050	0.000011	0.000004	0.000006			<0.00050
Tin, dissolved	mg/L	0.000088	0.000152		0.000207	0.000152		0.000487	0.000380	0.000259		<0.00050	0.000504	0.000286	0.000326			<0.00050
Titanium, dissolved	mg/L	0.000341	0.000221		0.000546	0.001142		0.001723	0.001329	0.000304		<0.00150	0.001106	0.000811	0.000304			<0.00150
Tungsten, dissolved	mg/L											<0.00050						<0.00050
Uranium, dissolved	mg/L	0.004074	0.003078	0.016046	0.007296	0.012555		0.007965	0.007106	0.005546	0.022348	0.00732	0.006000	0.000941	0.000158		0.000207	0.000081
Vanadium, dissolved	mg/L	0.000073	0.000018	0.000159	0.000232	0.000338		0.000237	0.000143	0.000044	0.000245	<0.00250	0.005654	0.000484	0.000112		0.000210	<0.00250
Zinc, dissolved	mg/L	0.053324	0.012031	0.055404	0.012012	0.017912		0.024960	0.075276	0.008849	0.141099	0.0276	0.034464	0.002756	0.003330		0.041362	0.0179
Zirconium, dissolved	mg/L	0.000015	0.000052	0.000240	0.001118	0.000320		0.001627	0.000902	0.000152	0.001648	<0.00100	0.003138	0.002685	0.001426		0.002985	0.00163
Isotopes																		
$d^{13}C$ - DIC	‰ VPDB											-9.4						-12.7
$d^{2}H$	‰ VSMOW			-162.9							-190.5	-197.3					-174.5	-178.9
$d^{18}O$	‰ VSMOW			-20.7							-23.8	-25.3					-22.1	-23.0
$\delta^{13}C_{CO2}$	‰ VPDB		-19.4							-22.2		-16.2			-24.0			-20.5
$\delta^{13}C_{CH4}$	‰ VPDB		-59.2									-42.4			-29.0			-
$\delta^{2}H_{CH4}$	‰ VSMOW											0						-
Dissolved Gases																		
CH_4	ppm	0.085	0.025					0.011	0.025	0.001		404.7734[1]	0.038	0.039	0.032			0.050
C_2H_6	ppm	0.0009	0.0003					0.0054	0.0107	0.0004		50.1118[1]	0.0006	0.0003	0.0000			-
C_3H_8	ppm	0.0004	0.0004					0.0021	0.0042	0.0002		13.2258[1]	0.0004	0.0000	0.0000			-
He	ppm or %v/v for 2024 results											<0.01						<0.01
O_2	ppm	5.23	1.40					0.84	0.63	0.47		1.50	1.40	0.79	1.66			15.45
N_2	ppm	36.45	19.47					31.01	37.04	2.72		82.85	52.68	37.96	29.58			142.84
CO_2	ppm	68.67	66.97					414.21	424.96	518.79		271.96	37.06	38.39	46.36			43.11

1-EERI 9 dissolved gas concentrations are likely overestimated due to effervescence during sampling.
(-) below detection limit for isotopes and dissolved gases
n/a headpsace not present in sample and therefore He not analyzed

Table A1: Groundwater Quality Summary Table

Well ID		EERI-11	EERI-12	EERI-12	EERI-12	EERI-12	EERI-12	EERI-13	EERI-13	EERI-13	EERI-13	EERI-13	EERI-14	EERI-14	EERI-14	EERI-14	EERI-14	EERI-15
Sample ID		EERI_11_1 (also labelled 11_2)	EERI_12_1	EERI_12_2	EERI_12_3	EERI-12MM	EERI-12	EERI_13_1	EERI_13_2	EERI_13_3	EERI-13MM	EERI-13	EERI_14_1	EERI_14_2	EERI_14_3	EERI-14MM	EER1-14	EERI_15_1
Date Sampled		22-Jul-2020	8-Jul-2019	29-Sep-2019	19-Jul-2020	1-Aug-2021	24-Aug-2024	8-Jul-2019	6-Oct-2019	23-Jul-2020	1-Aug-2021	16-Aug-2024	12-Jul-2019	6-Oct-2019	23-Jul-2020	1-Aug-2021	21-Aug-2024	6-Oct-2019
Analyte	**Units**																	
Field Results																		
Temperature	°C	6.7	7.7	11.3	8.5	9.8	7.2	7.7	6.6	7.4	10.2	8.6	10.6	8.9	11.9	9.5	8	7.2
pH		6.78	7.18	5.38	7.10	7.50	7.60	7.91	10.23	8.67	8.87		6.04	6.76	6.71	6.85	6.94	8.98
Conductivity	µS/cm	1069	1742	2150	895	1270	1098	2032	1425	1273	1775	1478	5160	4610	4520	5344	4820	1773
Dissolved Oxygen	mg/L	0	0	0.6	0	0.46	2.96	0.67	0.91	0	0.2	0.78	0	0.6	1.63	0.33	1.4	0.99
Oxidation-Reduction Potential	mV	-384.9	181.4	120.4	-43.1		10	276.4	80.3	-15.9		0	216.1	94.7	-22.1		-38	93.9
Eh	mV					194					188					181		
Lab Results																		
Physical Tests																		
Conductivity	µS/cm						1220					1680					5030	
Alkalinity (as HCO3)	mg/L	495	457	586	578	588		939	732	901	985		917	1091	1373	1696		1119
Alkalinity, bicarbonate (as CaCO3)	mg/L						488					667					1290	
Alkalinity, carbonate (as CaCO3)	mg/L						<1.0					109					<1.0	
Alkalinity, hydroxide (as CaCO3)	mg/L						<1.0					<1.0					<1.0	
Alkalinity, total (as CaCO3)	mg/L						488					776					<1.0	
Hardness (as CaCO3), dissolved	mg/L						129					91.7					1290	
Solids, total dissolved [TDS], calculated	mg/L						764					1090					4270	
pH	pH units						7.88					9.02					7.05	
Anions and Nutrients																		
Ammonia (NH4)	mg/L				0.45					0.24					0.08			
Ammonia, total (as N)	mg/L						0.589					1.03					0.804	
Bromide	mg/L	0.00	0.00	0.00				0.00	0.00	0.19			0.00	0.00			<1.00	0.76
Chloride	mg/L	5.43	0.48	0.85	0.48	0.92	<2.50	18.28	14.40	9.11	25.74	16.7	13.06	14.54	6.66	26.87	12.1	59.80
Fluoride	mg/L	1.88	0.40	0.50	0.18	0.12	0.148	3.01	1.61	0.69	0.57	0.636	0.00	0.00	0.14		<0.400	2.06
Nitrate (as NO3)	mg/L	2.37	2.48	2.55	2.42			5.27	2.08	3.71	5.89		1.45	0.00	3.67	15.64		4.09
Nitrate (as N)	mg/L						<0.0250					<0.0500					<0.100	
Nitrate + Nitrite (as N)	mg/L						<0.0255					<0.0510					<0.102	
Nitrite (as N)	mg/L						<0.0050					<0.0100					<0.0200	
Phosphate (as PO4)	mg/L	0.00	0.00	0.00			<0.0010	0.00	0.00			<0.0010	0.00	0.00	1.36		<0.0010	0.00
Sulfate (as SO4)	mg/L	93	328	273	180	150	173	199	179	143	140	145	2108	2524	2354	2692	2100	96
Organic / Inorganic Carbon																		
Carbon, dissolved inorganic [DIC]	mg/L						121					195					343	
Ion Balance																		
Anion sum	meq/L						13.4					19.0					69.8	
Cation sum	meq/L						13.2					19.7					71.4	
Ion balance (APHA)	%						-0.75					1.81					1.13	
Ion balance (cations/anions)	%						98.5					104					102	
Dissolved Metals																		
Aluminum, dissolved	mg/L	0.007881	0.009150	0.028922	0.000531	3.504640	0.0013	0.010433	0.065477	0.079684	135.411940	0.293	0.031525	0.023150	0.008675	29.898600	<0.0050	0.017918
Antimony, dissolved	mg/L	0.013788	0.000118	0.009599	0.000008	0.000016	0.00011	0.008514	0.001762	0.000370	0.000364	0.00019	0.008879	0.000350	0.000069	0.000161	<0.00050	0.000475
Arsenic, dissolved	mg/L	0.003020	0.001249	0.001117	0.000748	0.001353	0.00102	0.007423	0.005300	0.003147	0.003229	0.00404	0.007305	0.002520	0.001711	0.004452	0.00096	0.003126
Barium, dissolved	mg/L	0.175021	0.011795	0.012332	0.010843	0.017212	0.0139	0.033581	0.053757	0.092733	0.088420	0.0693	0.030268	0.015824	0.006634	0.025395	0.00518	0.114807
Beryllium, dissolved	mg/L	0.000003	0.000015	0.000004	0.000017	0.013000	<0.000020	0.000016	0.000001	0.000034		<0.000020	0.000016	0.000007	0.000085		<0.000100	0.000003
Bismuth, dissolved	mg/L	0.000000	0.000008	0.000009	0.000003	0.000003	<0.000050	0.000008	0.000006	0.000006	0.000002	<0.000050	0.000028	0.000020	0.000015	0.000012	<0.000250	0.000005
Boron, dissolved	mg/L	0.11	0.21	0.17	0.19	0.22	0.199	0.22	0.21	0.25	0.26	0.283	0.29	0.31	0.39	1.60	0.396	0.31
Cadmium, dissolved	mg/L	0.000016	0.000038	0.000028	0.000006	0.000014	0.0000094	0.000056	0.000025	0.000004	0.000011	<0.0000050	0.000147	0.000028	0.000009		<0.0000250	0.000026
Calcium, dissolved	mg/L	25.89	21.90	19.25	21.19	21.28	20.2	20.42	13.72	21.80	16.61	24.7	277.48	310.92	285.36	1210.65	286	15.39
Cesium, dissolved	mg/L	0.000008	0.000053	0.000057	0.000001	0.000024	0.000027	0.000037	0.000030	0.000010	0.000056	0.000042	0.000215	0.000140	0.000042	0.000182	<0.000050	0.000026
Chromium, dissolved	mg/L	0.000103	0.001775	0.001823	0.000137	0.002534	<0.00050	0.001754	0.002256	0.002517	0.002920	<0.00050	0.007099	0.007226	0.007168	0.031542	<0.00250	0.001830
Cobalt, dissolved	mg/L	0.000051	0.000207	0.000184	0.000136	0.000274	0.00059	0.000222	0.000068	0.000103	0.000053	<0.00010	0.003875	0.000579	0.000421	0.004056	<0.00050	0.000098
Copper, dissolved	mg/L	0.000697	0.000535	0.001468	0.000051	0.000565	0.00028	0.000521	0.000450	0.000103	0.000269	<0.00020	0.002190	0.001307	0.000257	0.001807	<0.00100	0.000382
Iron, dissolved	mg/L	0.32	0.23	0.32	0.00	0.30	<0.010	0.01	0.02	0.02	0.03	0.030	0.38	2.47	2.96	10.76	2.56	0.02
Lead, dissolved	mg/L	0.000016	0.000166	0.000234	0.000009	0.000057	<0.000050	0.000149	0.000101	0.000021	0.000044	<0.000050	0.000525	0.000372	0.000087	0.000122	<0.000250	0.000114
Lithium, dissolved	mg/L	0.009824	0.014436	0.010701	0.012085	0.012696	0.0131	0.007143	0.029898	0.009926	0.009135	0.0092	0.014692	0.018921	0.018877	0.062559	0.0187	0.091126
Magnesium, dissolved	mg/L	13.91	19.89	17.64	20.11	18.30	19.0	8.66	4.82	7.39	6.36	7.29	216.83	254.36	276.00	1010.97	266	5.67
Manganese, dissolved	mg/L	0.04	0.10	0.10	0.14	0.13	0.136	0.02	0.00	0.02	0.01	0.0138	0.33	0.18	0.24	1.11	0.387	0.01

Table A1: Groundwater Quality Summary Table

Well ID		EERI-11	EERI-12	EERI-12	EERI-12	EERI-12	EERI-12	EERI-13	EERI-13	EERI-13	EERI-13	EERI-13	EERI-14	EERI-14	EERI-14	EERI-14	EERI-14	EERI-15
Sample ID		EERI_11_1 (also labelled 11_2)	EERI_12_1	EERI_12_2	EERI_12_3	EERI-12MM	EERI-12	EERI_13_1	EERI_13_2	EERI_13_3	EERI-13MM	EERI-13	EERI_14_1	EERI_14_2	EERI_14_3	EERI-14MM	EER1-14	EERI_15_1
Date Sampled		22-Jul-2020	8-Jul-2019	29-Sep-2019	19-Jul-2020	1-Aug-2021	24-Aug-2024	8-Jul-2019	6-Oct-2019	23-Jul-2020	1-Aug-2021	16-Aug-2024	12-Jul-2019	6-Oct-2019	23-Jul-2020	1-Aug-2021	21-Aug-2024	6-Oct-2019
Mercury, dissolved	mg/L						<0.0000050					<0.0000050					<0.0000050	
Molybdenum, dissolved	mg/L	0.006644	0.000949	0.000895	0.000646	0.000923	0.00207	0.016238	0.008423	0.004548	0.004704	0.00463	0.017330	0.001091	0.000620	0.002881	0.000642	0.007505
Nickel, dissolved	mg/L	0.000434	0.000841	0.000743	0.000466	0.000479	0.00208	0.002429	0.000933	0.001070	0.000354	<0.00050	0.022134	0.003564	0.003147	0.013271	<0.00250	0.001236
Phosphorus, dissolved	mg/L						<0.050					<0.050					<0.250	
Potassium, dissolved	mg/L	4.32	2.83	2.41	2.19	2.40	2.41	1.96	6.89	1.74	2.12	1.99	6.52	5.81	4.73	23.04	6.26	3.68
Rubidium, dissolved	mg/L					0.001210	0.00129				0.001960	0.00150				0.010577	0.00298	
Selenium, dissolved	mg/L	0.003382	0.000177	0.000070	0.000075		<0.000050	0.001635	0.000242	0.000149		0.000161	0.001654	0.000122	0.000498		<0.000250	0.000573
Silicon, dissolved	mg/L	4.38	4.02	3.66	3.73	4.07	4.60	3.12	3.32	3.54	4.21	5.33	5.15	5.08	4.99	20.28	6.40	2.74
Silver, dissolved	mg/L						<0.000010					<0.000010					<0.000050	
Sodium, dissolved	mg/L	161.21	300.48	248.29	231.84	225.54	243	388.75	379.56	380.98	387.29	408	658.89	694.06	697.64	2787.06	802	508.88
Strontium, dissolved	mg/L	0.26	0.61	0.47	0.51	0.61	0.500	0.18	0.72	0.29	0.21	0.168	2.32	2.42	2.49	10.95	2.68	0.59
Sulfur, dissolved	mg/L	24.05	93.10	61.42	59.70	64.62	62.9	51.45	52.77	49.53	52.84	51.8	518.64	668.08	637.01	2953.80	751	28.95
Tellurium, dissolved	mg/L						<0.00020					<0.00020					<0.00100	
Thallium, dissolved	mg/L	0.000002	0.000024	0.000011	0.000008	0.000008	<0.000010	0.000036	0.000007	0.000005	0.000007	<0.000010	0.000064	0.000007	0.000012		<0.000050	0.000009
Thorium, dissolved	mg/L	0.000001	0.000004	0.000004	0.000001		<0.00010	0.000003	0.000003	0.000002		<0.00010	0.000012	0.000008	0.000006		<0.00050	0.000002
Tin, dissolved	mg/L	0.000010	0.000121	0.000164	0.000014		<0.00010	0.000138	0.000101	0.000094		<0.00010	0.000534	0.000403	0.000203		<0.00050	0.000098
Titanium, dissolved	mg/L	0.000235	0.000324	0.000199	0.000061		<0.00030	0.000333	0.000618	0.000274		<0.00030	0.000928	0.001061	0.000465		<0.00150	0.000516
Tungsten, dissolved	mg/L						0.00222					<0.00010					<0.00050	
Uranium, dissolved	mg/L	0.000649	0.000692	0.000635	0.000600	0.000710	0.000619	0.026280	0.008129	0.003768	0.004071	0.00418	0.002755	0.001571	0.001522	0.009239	0.00330	0.002782
Vanadium, dissolved	mg/L	0.000298	0.000052	0.000051	0.000009	0.000029	<0.00050	0.000615	0.001338	0.000329	0.000448	0.00060	0.000746	0.000196	0.000054	0.000138	<0.00250	0.000363
Zinc, dissolved	mg/L	0.002632	0.001005	0.012262	0.006191	0.012946	0.0801	0.000960	0.003710	0.006657	0.007545	0.0042	0.008088	0.061211	0.021747	0.088265	<0.0050	0.001640
Zirconium, dissolved	mg/L	0.000243	0.000059	0.000031	0.000004	0.000032	<0.00030	0.001127	0.001420	0.000702	0.000740	<0.00060	0.005180	0.003886	0.002815	0.010423	<0.00260	0.000655
Isotopes																		
$d^{13}C$ - DIC	‰ VPDB						-8.2					-11.7					-3.7	
$d^{2}H$	‰ VSMOW					-182.0	-185.5				-189.8	-194.4				-186.5	-189.9	
$d^{18}O$	‰ VSMOW					-23.2	-24.1				-24.1	-25.1				-23.3	-24.1	
$\delta^{13}C_{CO2}$	‰ VPDB				-18.85		-15.3			-21.8		-			-17.7		-11.7	
$\delta^{13}C_{CH4}$	‰ VPDB						-					-					-	
$\delta^{2}H_{CH4}$	‰ VSMOW						-					-					-	
Dissolved Gases																		
CH_4	ppm	0.018	0.036	0.001	0.001		0.007	0.008	0.011	0.007		0.008	0.002	0.003	0.002		0.017	0.008
C_2H_6	ppm	0.0006	0.0000	0.0000	0.0000		-	0.0000	0.0003	0.0003		-	0.0000	0.0003	0.0003		-	0.0000
C_3H_8	ppm	0.0004	0.0000	0.0000	0.0000		-	0.0000	0.0000	0.0000		-	0.0000	0.0004	0.0000		-	0.0000
He	ppm or %v/v for 2024 results						0.02					0.01					0.01	
O_2	ppm	1.23	2.71	1.45	1.77		20.54	1.06	0.75	1.34		17.80	1.00	1.04	2.33		19.97	1.86
N_2	ppm	25.88	36.64	28.49	22.19		135.90	55.32	40.25	33.95		147.45	22.94	24.73	30.12		446.57	32.65
CO_2	ppm	16.01	80.65	49.21	50.99		42.34	22.76	1.01	7.11		3.64	266.01	333.96	356.67		222.76	7.91

1-EERI 9 dissolved gas concentrations are likely overestimated due to effervescence during sampling.
(-) below detection limit for isotopes and dissolved gases
n/a headpsace not present in sample and therefore He not analyzed

Table A1: Groundwater Quality Summary Table

Well ID		EERI-15	EERI-15	EERI-15	EERI-16	EERI-16	EERI-16	EERI-16	EERI-17	EERI-17	EERI-17	EERI-17	EERI-18	EERI-18	EERI-18	EERI-18	EERI-19	EERI-19
Sample ID		**EERI_15_2**	**EERI-15MM**	**EERI-15**	**EERI_16_1**	**EERI_16_2**	**EERI-16MM**	**EERI-16**	**EERI_17_1**	**EERI_17_2**	**EERI-17MM**	**EERI-17**	**EERI_18A_1**	**EERI_18A_2**	**EERI-18AMM**	**EFRI-18A**	**EERI_19_1**	**EERI_19_2**
Date Sampled		24-Jul-2020	1-Aug-2021	16-Aug-2024	7-Oct-2019	28-Jul-2020	1-Aug-2021	20-Aug-2024	7-Oct-2019	28-Jul-2020	1-Aug-2021	20-Aug-2024	30-Sep-2019	19-Jul-2020	1-Aug-2021	14-Aug-2024	3-Oct-2019	18-Jul-2020
Analyte	**Units**																	
Field Results																		
Temperature	°C	8	8.7	9	4.9	11.4	12.7	8.7	5.4	7.4	7.4	7.4	8.6	7.8	12.4	14.4	7.4	8.3
pH		8.40	9.08		13.06	12.28	8.59	13.23	7.60	7.75	7.26	7.57	6.86	7.04	6.92		7.33	7.14
Conductivity	µS/cm	1488	2090	1610	7344	2725	2554	5160	454	438.2	572	511	3740	3680	4576	3980	1475	1256
Dissolved Oxygen	mg/L	0.19	0.3	2.06	4.84	1.93	1.04	1.35	0.3	0.05	0.37	1.34	0.49	0	0.88	0.81	0.41	0.09
Oxidation-Reduction Potential	mV	187.4		75	184.4	150.7		-46	210.3	215		-17	105.5	-33.1		-54	94.8	-41.7
Eh	mV		232				-108				117				114			
Lab Results																		
Physical Tests																		
Conductivity	µS/cm			1800				5190				547				4510		
Alkalinity (as HCO3)	mg/L	1160	1227		542	190	1051		315	345	345		744	749	754		863	903
Alkalinity, bicarbonate (as CaCO3)	mg/L			643				<1.0				293				565		
Alkalinity, carbonate (as CaCO3)	mg/L			221				228				<1.0				<1.0		
Alkalinity, hydroxide (as CaCO3)	mg/L			<1.0				1090				<1.0				<1.0		
Alkalinity, total (as CaCO3)	mg/L			864				1320				293				565		
Hardness (as CaCO3), dissolved	mg/L			48.4				1010				288				1550		
Solids, total dissolved [TDS], calculated	mg/L			1100				1390				315				3740		
pH	pH units			9.35				12.3				7.58				7.56		
Anions and Nutrients																		
Ammonia (NH4)	mg/L	0.5				5.12				0				0.74			0.94	7.2
Ammonia, total (as N)	mg/L			1.01				7.43				0.103				1.16		
Bromide	mg/L	0.50			0.00		0.43		0.00	0.12			0.00				0.00	
Chloride	mg/L	34.06	67.21	47.3	35.33	6.02	3.63	<25.0	5.64	4.20	5.35	4.92	3.16	1.47	5.16	<10.0	1.41	0.71
Fluoride	mg/L	0.83	0.98	0.420	0.55	0.34	0.91	<1.00	0.37	0.15	0.19	0.179	0.25			<0.400	0.88	0.38
Nitrate (as NO3)	mg/L	3.73	6.66		0.00		0.00		0.78	1.54	1.28		0.25		5.42		3.69	
Nitrate (as N)	mg/L			<0.0500				<0.250				<0.0050				<0.100		
Nitrate + Nitrite (as N)	mg/L			<0.0510				<0.255				<0.0051				<0.102		
Nitrite (as N)	mg/L			<0.0100				<0.0500				<0.0010				<0.0200		
Phosphate (as PO4)	mg/L			<0.0010	0.00	6.21		<0.0010	0.61	5.41		<0.0010	0.00	2.53		<0.0010	0.00	
Sulfate (as SO4)	mg/L	82	86	67.2	130	262	524	48.8	19	17	14	15.8	2095	2237	3558	2320	257	203
Organic / Inorganic Carbon																		
Carbon, dissolved inorganic [DIC]	mg/L			174				0.85				72.2				166		
Ion Balance																		
Anion sum	meq/L			20.0				27.4				6.33				59.6		
Cation sum	meq/L			19.9				26.3				5.94				55.4		
Ion balance (APHA)	%			-0.25				-2.05				-3.18				-3.65		
Ion balance (cations/anions)	%			99.5				96.0				93.8				93.0		
Dissolved Metals																		
Aluminum, dissolved	mg/L	0.009796	16.597400	0.0409	0.030542	0.012316	53.819000	0.0079	0.004062	0.000890	1.914520	<0.0010	0.048655	0.009567	42.718200	0.0067	0.008774	0.004583
Antimony, dissolved	mg/L	0.000098	0.000112	0.00038	0.000150	0.000192	0.000217	0.00021	0.000027	0.000028	0.000014	<0.00010	0.000221	0.000028	0.000075	<0.00020	0.000111	0.000016
Arsenic, dissolved	mg/L	0.002042	0.002032	0.00243	0.000518	0.000759	0.001982	0.00034	0.000481	0.000508	0.000463	0.00055	0.002350	0.001695	0.006946	0.00348	0.000646	0.000831
Barium, dissolved	mg/L	0.066702	0.082454	0.138	0.701635	0.400086	0.119984	0.428	0.130997	0.136315	0.146737	0.139	0.030701	0.018653	0.047768	0.00904	0.023377	0.015718
Beryllium, dissolved	mg/L	0.000034	0.010240	<0.000020	0.000024	0.000080	0.033360	<0.000040	0.000001	0.000016	<0.0050	<0.000020	0.000014	0.000085		<0.000040	0.000002	0.000034
Bismuth, dissolved	mg/L	0.000006	0.000001	<0.000050	0.000022	0.000089	0.000002	<0.000100	0.000000	0.000016	0.000001	<0.000050	0.000015	0.000020	0.000010	<0.000100	0.000005	0.000007
Boron, dissolved	mg/L	0.37	0.38	0.321	0.04	0.41	0.95	0.154	0.02	0.03	0.03	0.029	0.18	0.25	0.68	0.218	0.36	0.44
Cadmium, dissolved	mg/L	0.000006		<0.0000050	0.000044	0.000069		<0.0000100	0.000008	0.000019	0.000007	<0.0000050	0.000041	0.000011		<0.0000100	0.000010	0.000005
Calcium, dissolved	mg/L	11.00	13.39	12.0	640.46	57.36	29.99	406	87.05	89.30	89.23	83.2	260.95	273.95	812.37	319	39.13	36.81
Cesium, dissolved	mg/L	0.000006	0.000039	0.000043	0.000065	0.000012	0.000043	0.000027	0.000017	0.000004	0.000004	<0.000010	0.000172	0.000031	0.000052	<0.000020	0.000029	0.000015
Chromium, dissolved	mg/L	0.002240	0.002619	0.00084	0.041490	0.005995	0.006103	<0.00100	0.000067	0.000232	0.001271	<0.00050	0.006232	0.007458	0.015018	<0.00100	0.001797	0.002526
Cobalt, dissolved	mg/L	0.000060	0.000038	<0.00010	0.000072	0.000038	0.000000	<0.00020	0.000390	0.000332	0.000537	0.00036	0.003519	0.001898	0.006484	0.00166	0.000336	0.000112
Copper, dissolved	mg/L	0.000103	0.000208	0.00077	0.002218	0.001371	0.000456	<0.00040	0.000033	0.000197	0.000134	<0.00020	0.001022	0.000514	0.000492	<0.00040	0.000372	0.000103
Iron, dissolved	mg/L	0.03	0.02	<0.010	0.07	0.02	0.04	<0.020	0.26	0.23	0.23	0.253	3.01	9.90	19.65	5.67	0.22	0.47
Lead, dissolved	mg/L	0.000029	0.000074	<0.000050	0.000947	0.000192	0.000053	<0.000100	0.000016	0.000019	0.000026	<0.000050	0.000395	0.000103	0.000246	<0.000100	0.000087	0.000024
Lithium, dissolved	mg/L	0.082322	0.082136	0.0777	0.165861	0.242973	0.591903	0.148	0.013194	0.013951	0.013235	0.0137	0.048607	0.062541	0.172792	0.0780	0.054392	0.059223
Magnesium, dissolved	mg/L	5.87	5.20	4.48	0.19	0.13	12.86	0.0696	16.22	16.90	17.10	19.4	140.27	183.72	472.47	183	19.43	19.57
Manganese, dissolved	mg/L	0.01	0.01	0.00177	0.00	0.00	0.01	<0.00020	0.15	0.15	0.13	0.137	0.87	0.68	1.25	0.304	0.12	0.10

Table A1: Groundwater Quality Summary Table

Well ID		EERI-15	EERI-15	EERI-15	EERI-16	EERI-16	EERI-16	EERI-16	EERI-17	EERI-17	EERI-17	EERI-17	EERI-18	EERI-18	EERI-18	EERI-18	EERI-19	EERI-19
Sample ID		**EERI_15_2**	**EERI-15MM**	**EERI-15**	**EERI_16_1**	**EERI_16_2**	**EERI-16MM**	**EERI-16**	**EERI_17_1**	**EERI_17_2**	**EERI-17MM**	**EERI-17**	**EERI_18A_1**	**EERI_18A_2**	**EERI-18AMM**	**EFRI-18A**	**EERI_19_1**	**EERI_19_2**
Date Sampled		24-Jul-2020	1-Aug-2021	16-Aug-2024	7-Oct-2019	28-Jul-2020	1-Aug-2021	20-Aug-2024	7-Oct-2019	28-Jul-2020	1-Aug-2021	20-Aug-2024	30-Sep-2019	19-Jul-2020	1-Aug-2021	14-Aug-2024	3-Oct-2019	18-Jul-2020
Mercury, dissolved	mg/L			<0.0000050				<0.0000050				<0.0000050				<0.0000050		
Molybdenum, dissolved	mg/L	0.005618	0.006949	0.00709	0.010521	0.002047	0.000467	0.00205	0.002418	0.002617	0.002790	0.00261	0.001780	0.000623	0.001770	0.000709	0.001245	0.000963
Nickel, dissolved	mg/L	0.001020	0.000518	0.00101	0.002418	0.001153	0.006581	<0.00100	0.000856	0.000727	0.001243	0.00062	0.007092	0.004501	0.020295	0.00340	0.001235	0.000955
Phosphorus, dissolved	mg/L			0.056				<0.100				<0.050				<0.100		
Potassium, dissolved	mg/L	1.79	1.93	2.45	20.05	6.27	3.82	4.26	1.95	1.91	2.02	2.05	6.70	6.02	17.00	6.99	3.51	2.54
Rubidium, dissolved	mg/L		0.001543	0.00192			0.003411	0.00377			0.000380	0.00036			0.008785	0.00315		
Selenium, dissolved	mg/L	0.000162		0.000366	0.000558	0.000121		0.000556	0.000033	0.000029	<0.00018	<0.000050	0.000183	0.000342		<0.000100	0.000113	0.000187
Silicon, dissolved	mg/L	2.76	2.92	3.56	0.24	1.71	5.79	1.12	2.90	3.31	3.49	3.92	4.96	4.73	13.97	6.35	3.49	3.58
Silver, dissolved	mg/L			<0.000020				<0.000020				<0.000010				<0.000020		
Sodium, dissolved	mg/L	480.59	477.08	432	158.38	284.84	753.22	124	3.15	2.87	2.66	2.85	583.89	575.71	1440.90	551	337.41	342.86
Strontium, dissolved	mg/L	0.20	0.21	0.0699	12.40	2.14	0.94	0.740	0.31	0.32	0.37	0.346	1.44	1.82	5.92	2.09	0.40	0.41
Sulfur, dissolved	mg/L	29.66	30.97	23.7	37.94	65.49	236.66	26.5	5.84	5.43	6.11	5.79	507.28	640.70	2018.62	839	63.82	65.81
Tellurium, dissolved	mg/L			<0.00020				<0.00040				<0.00020				<0.00040		
Thallium, dissolved	mg/L	0.000008	0.000011	<0.000010	0.000015	0.000075		<0.000020	0.000012	0.000025	0.000014	0.000012	0.000009	0.000012		<0.000020	0.000004	0.000007
Thorium, dissolved	mg/L	0.000002		<0.00010	0.000007	0.000087		<0.00020	0.000001	0.000016	<0.0000036	<0.00010	0.000012	0.000010		<0.00020	0.000002	0.000004
Tin, dissolved	mg/L	0.000079		<0.00010	0.000810	0.000317		<0.00020	0.000000	0.000025		<0.00010	0.000297	0.000257		<0.00020	0.000096	0.000082
Titanium, dissolved	mg/L	0.000283		<0.00030	0.001635	0.000424		<0.00060	0.000127	0.000009		<0.00030	0.000984	0.000304		<0.00060	0.000394	0.000177
Tungsten, dissolved	mg/L			<0.00010				<0.00020				<0.00010				0.00023		
Uranium, dissolved	mg/L	0.001432	0.001761	0.00164	0.000053	0.000149	0.000507	<0.000020	0.001611	0.001393	0.001427	0.00150	0.008416	0.002540	0.008578	0.00354	0.001223	0.000878
Vanadium, dissolved	mg/L	0.000174	0.000225	0.00076	0.000235	0.000435	0.000259	<0.00100	0.000038	0.000025	0.000019	<0.00050	0.000233	0.000070	0.000170	<0.00100	0.000072	0.000051
Zinc, dissolved	mg/L	0.013864	0.019907	0.0540	0.016227	0.003844	0.008509	0.0036	0.003057	0.004173	0.002938	0.0016	0.009251	5.917957	0.141606	0.0472	0.002128	0.005231
Zirconium, dissolved	mg/L	0.000369	0.000421	<0.00060	0.000078	0.000132	0.001006	<0.00040	0.000017	0.000017	0.000013	<0.00030	0.000733	0.000332	0.001048	<0.00040	0.000213	0.000129
Isotopes																		
$d^{13}C$ - DIC	‰ VPDB			-8.4				-16.3				-12.1				-7.1		
$d^{2}H$	‰ VSMOW		-174.9	-178.8			-167.7	-167.5			-162.8	-165.8			-168.1	-171.8		
$d^{18}O$	‰ VSMOW		-22.1	-23.0			-20.8	-21.2			-20.7	-21.3			-21.3	-22.1		
$\delta^{13}C_{CO2}$	‰ VPDB	-19.4		-				-28.2		-23.2		-20.2		-17.1		-13.9		-20.6902701
$\delta^{13}C_{CH4}$	‰ VPDB			-		-51.6		-53.4		-45.3		-		-40.3		-		-29.5791292
$\delta^{2}H_{CH4}$	‰ VSMOW			-				-294.1				-				-		
Dissolved Gases																		
CH_4	ppm	0.008		0.009	23.410	31.998		35.242	0.011	0.184		0.017	0.010	0.020		0.009	0.006	0.009
C_2H_6	ppm	0.0000		-	0.9892	2.2864		2.7562	0.0012	0.0185		-	0.0006	0.0047		-	0.0006	0.0018
C_3H_8	ppm	0.0000		-	0.0093	0.0711		0.0557	0.0000	0.0008		-	0.0004	0.0029		-	0.0004	0.0004
He	ppm or %v/v for 2024 results			<0.01				N/A				<0.01				N/A		
O_2	ppm	1.33		20.94	3.71	1.20		0.45	1.98	2.40		20.36	1.19	1.18		0.79	1.56	2.46
N_2	ppm	27.70		367.12	13.55	9.37		16.74	36.81	33.42		844.51	28.45	29.01		25.81	40.63	39.17
CO_2	ppm	10.41		2.19	0.29	0.21		1.47	19.74	29.63		29.29	98.24	78.33		96.44	45.95	58.05

1-EERI 9 dissolved gas concentrations are likely overestimated due to effervescence during sampling.
(-) below detection limit for isotopes and dissolved gases
n/a headpsace not present in sample and therefore He not analyzed

Table A1: Groundwater Quality Summary Table

Well ID		EERI-19	EERI-20	EERI-20	EERI-20	EERI-21	EERI-21	EERI-21	EERI-21	EERI-22	EERI-22	EERI-22	EERI-23	EERI-23	EERI-23	EERI-23	EERI-24	EERI-24
Sample ID		**EERI-19**	**EERI_20_1**	**EERI_20_2**	**EERI-20**	**EERI_21_1**	**EERI_21_2**	**EERI-21MM**	**EERI-21**	**EERI_22_1**	**EERI_22_2**	**EERI-22**	**EERI_23_1**	**EERI_23_2**	**EERI-23MM**	**EER1-23**	**EERI_24_1**	**EERI_24_2**
Date Sampled		13-Aug-2024	2-Oct-2019	16-Jul-2020	15-Aug-2024	1-Oct-2019	17-Jul-2020	1-Aug-2021	15-Aug-2024	5-Oct-2019	26-Jul-2020	18-Aug-2024	5-Oct-2019	25-Jul-2020	1-Aug-2021	27-Aug-2024	2-Oct-2019	16-Jul-2020
Analyte	**Units**																	
Field Results																		
Temperature	°C	11.3	10.4	10.5	11.7	10.7	6.4	11.6	12.2	10.2	7.8	8.7	8.3	13.6	13	7.8	12.2	11.3
pH		7.65	12.93	12.63		6.40	7.35	5.30		6.52	7.46		10.75	8.65	6.60	7.53	13.17	12.57
Conductivity	µS/cm	1485	15180	12910	7210	6296	1023	6960	5900	6270	475.4	546	556	632	778	773	17791	11870
Dissolved Oxygen	mg/L	1.63	6.48	4.23	2.4	0.62	0.4	0.59	10.74	0	0.17	0.78	4.25	0.23	4.6	2.02	9.4	0.64
Oxidation-Reduction Potential	mV	78	99.5	34	-53	82.6	516		-56	-25	183.6	-55	116.1	241.7		-17	48.3	-38.2
Eh	mV							74.9							120			
Lab Results																		
Physical Tests																		
Conductivity	µS/cm	1690			7230				6690			583				814		
Alkalinity (as HCO3)	mg/L		770	579		268	373	773		364	372		154	399	516		849	539
Alkalinity, bicarbonate (as CaCO3)	mg/L	730			<1.0				348			324				460		
Alkalinity, carbonate (as CaCO3)	mg/L	27.0			61.2				<1.0			<1.0				<1.0		
Alkalinity, hydroxide (as CaCO3)	mg/L	<1.0			1840				<1.0			<1.0				<1.0		
Alkalinity, total (as CaCO3)	mg/L	757			1900				348			324				460		
Hardness (as CaCO3), dissolved	mg/L	180			1740				2350			310				444		
Solids, total dissolved [TDS], calculated	mg/L	1100			2030				6360			346				474		
pH	pH units	8.41			12.6				6.81			8.01				7.62		
Anions and Nutrients																		
Ammonia (NH4)	mg/L			7.2			5.6				0			0.62				6.72
Ammonia, total (as N)	mg/L	1.10			5.85				23.9			0.159				0.470		
Bromide	mg/L		0.00			0.00				0.00	0.07		0.00	0.05			0.00	
Chloride	mg/L	<5.00	0.86	0.53	<25.0	9.48	4.29	17.95	<25.0	0.35	0.08	<0.50	16.04	1.58	1.55	<2.50	0.83	3.39
Fluoride	mg/L	0.384	0.00		<1.00	3.52	1.21	0.90	1.37	0.32	0.11	0.171	2.12	0.28	0.19	0.228	0.00	0.36
Nitrate (as NO3)	mg/L		0.00			0.00		11.59		1.69	1.64		0.00	1.78	1.88		0.12	0.50
Nitrate (as N)	mg/L	<0.0500			<0.250				<0.250			<0.0050				<0.0250		
Nitrate + Nitrite (as N)	mg/L	<0.0510			<0.255				<0.255			<0.0051				<0.0255		
Nitrite (as N)	mg/L	<0.0100			<0.0500				<0.0500			<0.0010				<0.0050		
Phosphate (as PO4)	mg/L	<0.0010	0.00		<0.0010	0.00	2.97		<0.0010	0.00		<0.0010	1.20			<0.0010	0.00	
Sulfate (as SO4)	mg/L	201	8	3	79.4	4006	4007	4785	4300	20	13	15.3	63	16	13	13.1	6	20
Organic / Inorganic Carbon																		
Carbon, dissolved inorganic [DIC]	mg/L	202			0.81				147			86.1				122		
Ion Balance																		
Anion sum	meq/L	19.3			39.6				96.6			6.80				9.48		
Cation sum	meq/L	19.7			39.9				93.7			6.65				9.74		
Ion balance (APHA)	%	1.02			0.38				-1.52			-1.12				1.35		
Ion balance (cations/anions)	%	102			101				97.0			97.8				103		
Dissolved Metals																		
Aluminum, dissolved	mg/L	0.0168	0.123438	0.047059	0.0066	0.049256	0.017294	63.437200	0.0178	0.002624	0.003064	<0.0010	0.002454	0.004364	1.894590	0.0010	0.211335	0.044885
Antimony, dissolved	mg/L	<0.00020	0.000166	0.000075	<0.00050	0.000095	0.000099	0.000093	<0.00050	0.000055	0.000010	<0.00010	0.004535	0.000090	0.000061	<0.00010	0.000401	0.000123
Arsenic, dissolved	mg/L	0.00096	0.000838	0.000348	<0.00050	0.005716	0.000269	0.029857	0.00990	0.001796	0.002142	0.00259	0.001030	0.001604	0.001556	0.00181	0.003617	0.005090
Barium, dissolved	mg/L	0.0178	3.902530	3.751116	1.22	0.011187	0.004777	0.022182	0.00499	0.124465	0.126840	0.146	0.035413	0.087561	0.135076	0.171	3.788356	2.439440
Beryllium, dissolved	mg/L	<0.000040	0.000000	0.000169	<0.000100	0.000019	0.000169	0.108800	<0.000100	0.000001	0.000017	<0.000020	0.000000	0.000017	<0.0050	<0.000020	0.000018	0.000169
Bismuth, dissolved	mg/L	<0.000100	0.000092	0.000033	<0.000250	0.000040	0.000029	0.000012	<0.000250	0.000000	0.000003	<0.000050	0.000000	0.000003	0.000001	<0.000050	0.000097	0.000029
Boron, dissolved	mg/L	0.443	0.01	0.02	<0.050	0.38	0.61	2.07	0.665	0.03	0.03	0.034	0.03	0.06	0.07	0.078	0.01	0.04
Cadmium, dissolved	mg/L	<0.0000100	0.000084	0.000019	<0.0000250	0.000040	0.000019		<0.0000250	0.000011	0.000003	<0.0000050	0.000043	0.000010	0.000005	<0.0000050	0.000187	0.000053
Calcium, dissolved	mg/L	37.8	718.16	750.85	695	363.29	391.63	1440.29	412	86.71	83.02	86.6	8.99	54.18	72.31	99.9	629.19	513.54
Cesium, dissolved	mg/L	0.000037	0.000369	0.000014	0.000416	0.000274	0.000025	0.000039	<0.000050	0.000012	0.000011	<0.000010	0.000004	0.000010	0.000036	0.000016	0.000338	0.000014
Chromium, dissolved	mg/L	<0.00100	0.043391	0.025888	0.0150	0.014491	0.014810	0.031078	<0.00250	0.000087	0.000933	<0.00050	0.001505	0.001032	0.001012	<0.00050	0.050558	0.016560
Cobalt, dissolved	mg/L	<0.00020	0.000074	0.000103	<0.00050	0.002604	0.001547	0.010326	0.00255	0.000360	0.000240	0.00023	0.000057	0.000134	0.000252	0.00058	0.000217	0.000127
Copper, dissolved	mg/L	<0.00040	0.010048	0.002217	0.00266	0.003114	0.002097	0.000000	<0.00100		0.000051	<0.00020	0.000196	0.000051	0.000062	<0.00020	0.011875	0.002867
Iron, dissolved	mg/L	0.399	0.19	0.04	<0.050	142.59	0.31	530.69	138	0.51	0.87	1.05	0.00	0.07	0.46	0.730	0.23	0.04
Lead, dissolved	mg/L	<0.000100	0.003214	0.001385	0.000502	0.000779	0.000185	0.000122	<0.000250	0.000015	0.000009	<0.000050	0.000015	0.000019	0.000010	<0.000050	0.003137	0.000684
Lithium, dissolved	mg/L	0.0596	0.567541	0.335628	0.0647	0.094717	0.126757	0.393985	0.136	0.008322	0.009709	0.0112	0.049136	0.052708	0.049097	0.0515	0.429744	0.187013
Magnesium, dissolved	mg/L	20.9	0.10	0.19	0.0343	238.71	307.99	987.43	320	20.85	23.54	22.9	6.71	31.82	36.72	47.2	0.28	0.04
Manganese, dissolved	mg/L	0.0911	0.00	0.00	<0.00050	0.37	0.25	0.84	0.241	0.39	0.44	0.431	0.00	0.20	0.24	0.243	0.00	0.00

Table A1: Groundwater Quality Summary Table

Well ID		EERI-19	EERI-20	EERI-20	EERI-20	EERI-21	EERI-21	EERI-21	EERI-21	EERI-22	EERI-22	EERI-22	EERI-23	EERI-23	EERI-23	EERI-23	EERI-24	EERI-24
Sample ID		**EERI-19**	**EERI_20_1**	**EERI_20_2**	**EERI-20**	**EERI_21_1**	**EERI_21_2**	**EERI-21MM**	**EERI-21**	**EERI_22_1**	**EERI_22_2**	**EERI-22**	**EERI_23_1**	**EERI_23_2**	**EERI-23MM**	**EER1-23**	**EERI_24_1**	**EERI_24_2**
Date Sampled		13-Aug-2024	2-Oct-2019	16-Jul-2020	15-Aug-2024	1-Oct-2019	17-Jul-2020	1-Aug-2021	15-Aug-2024	5-Oct-2019	26-Jul-2020	18-Aug-2024	5-Oct-2019	25-Jul-2020	1-Aug-2021	27-Aug-2024	2-Oct-2019	16-Jul-2020
Mercury, dissolved	mg/L	<0.0000050			<0.0000050				<0.0000050			<0.0000050				<0.0000050		
Molybdenum, dissolved	mg/L	0.00110	0.003646	0.002798	0.00366	0.001667	0.000217	0.007008	0.00209	0.002064	0.001816	0.00208	0.020372	0.005237	0.003820	0.00349	0.006308	0.019006
Nickel, dissolved	mg/L	<0.00100	0.005803	0.003166	<0.00250	0.010039	0.006238	0.029358	0.00714	0.000705	0.000572	0.00065	0.000651	0.001130	0.001700	0.00485	0.007706	0.034148
Phosphorus, dissolved	mg/L	<0.100			<0.250				0.469			<0.050				<0.050		
Potassium, dissolved	mg/L	3.00	144.37	47.76	7.02	35.61	33.28	130.28	37.5	1.88	1.66	2.14	8.55	4.86	4.58	3.35	157.63	36.54
Rubidium, dissolved	mg/L	0.00217			0.00871			0.040816	0.0117			0.00068			0.003275	0.00165		
Selenium, dissolved	mg/L	<0.000100	0.000556	0.000685	<0.000250	0.000715	0.000996		0.000304	0.000027	0.000056	<0.000050	0.002936	0.000162	<0.00018	<0.000050	0.001212	0.002427
Silicon, dissolved	mg/L	4.46	0.11	0.09	<0.250	2.09	1.47	7.46	2.95	4.67	4.63	5.59	1.41	3.95	4.84	6.02	0.18	0.17
Silver, dissolved	mg/L	<0.000020			<0.000050				<0.000050			<0.000010				<0.000010		
Sodium, dissolved	mg/L	367	695.94	365.74	105	709.76	866.78	3035.17	902	7.50	7.37	7.45	100.43	54.58	33.90	16.5	906.15	552.16
Strontium, dissolved	mg/L	0.436	48.28	44.10	6.33	0.13	0.11	0.42	0.101	0.30	0.32	0.370	0.21	0.29	0.43	0.440	43.04	18.36
Sulfur, dissolved	mg/L	72.8	2.70	2.02	14.7	950.73	1172.21	4575.92	1450	5.81	5.35	5.26	17.85	6.92	5.62	4.93	2.54	5.38
Tellurium, dissolved	mg/L	<0.00040			<0.00100				<0.00100			<0.00020				<0.00020		
Thallium, dissolved	mg/L	<0.000020	0.000009	0.000023	<0.000050	0.000016	0.000023		<0.000050	0.000005	0.000002	<0.000010	0.000002	0.000002		<0.000010	0.000045	0.000023
Thorium, dissolved	mg/L	<0.00020	0.000024	0.000012	<0.00050	0.000016	0.000012		<0.00050	0.000001	0.000001	<0.00010	0.000001	0.000001	<0.0000036	<0.00010	0.000025	0.000012
Tin, dissolved	mg/L	<0.00020	0.001997	0.000591	<0.00050	0.000911	0.000580		<0.00050	0.000007	0.000022	<0.00010	0.000024	0.000037		<0.00010	0.002664	0.000810
Titanium, dissolved	mg/L	<0.00060	0.000051	0.000608	<0.00150	0.000915	0.000608		<0.00150	0.000196	0.000120	<0.00030	0.000223	0.000124		<0.00030	0.000877	0.001106
Tungsten, dissolved	mg/L	<0.00020			<0.00050				<0.00050			<0.00010				0.00148		
Uranium, dissolved	mg/L	0.00100	0.000039	0.000029	<0.000050	0.002933	0.001274	0.010516	0.00339	0.002071	0.001469	0.00189	0.000872	0.001093	0.000375	0.000292	0.000072	0.000013
Vanadium, dissolved	mg/L	<0.00100	0.000297	0.000120	<0.00250	0.000609	0.000114	0.001880	<0.00250	0.000074	0.000024	<0.00050	0.000198	0.000029	0.000026	<0.00050	0.000930	0.001303
Zinc, dissolved	mg/L	0.0195	0.038098	0.365487	0.416	0.010105	0.004761	0.095541	0.0236	0.001432	0.010008	0.0114	0.002016	0.007284	0.018582	0.0177	0.030178	1.332763
Zirconium, dissolved	mg/L	<0.00040	0.000152	0.000044	<0.00100	0.000161	0.000135	0.000923	<0.00100	0.000016	0.000004	<0.00030	0.000001	0.000034	0.000036	<0.00030	0.000172	0.000044
Isotopes																		
$d^{13}C$ - DIC	‰ VPDB	-9.75			-8.4				-20.6			-11.3				-10.5		
$d^{2}H$	‰ VSMOW	-173.05836			-174.7			-192.5	-195.5			-165.8			-165.6	-170.7		
$d^{18}O$	‰ VSMOW	-21.8419627			-22.1			-24.8	-25.1			-21.3			-21.0	-22.1		
$\delta^{13}C_{CO2}$	‰ VPDB	-18.1			-		-32.6		-24.6		-22.3	-19.1		-23.0		-19.0		
$\delta^{13}C_{CH4}$	‰ VPDB	-		-61.1	-		-56.7		-			-				-		-67.4
$\delta^{2}H_{CH4}$	‰ VSMOW	-			-				-			-				-		
Dissolved Gases																		
CH_4	ppm	0.007	0.073	0.061	-	0.016	0.017		0.011	0.003	0.003	0.006	0.004	0.008		0.003	0.043	1.034
C_2H_6	ppm	-	0.0063	0.0050	-	0.0003	0.0012		-	0.0003	0.0003	-	0.0012	0.0023		-	0.0027	0.0223
C_3H_8	ppm	-	0.0038	0.0029	-	0.0004	0.0004		-	0.0004	0.0000	-	0.0000	0.0000		-	0.0017	0.0161
He	ppm or %v/v for 2024 results	N/A			N/A				0.01			<0.01				N/A		
O_2	ppm	6.00	5.33	4.85	15.69	0.85	0.99		13.36	1.14	4.21	20.24	2.15	1.72		4.57	11.77	2.76
N_2	ppm	71.80	26.39	31.26	99.58	34.78	30.70		187.80	27.49	35.21	575.01	34.39	32.29		44.49	23.75	28.48
CO_2	ppm	30.23	0.58	0.38	1.46	231.26	260.61		391.13	25.00	34.98	25.58	0.86	6.40		35.23	0.29	0.18

1-EERI 9 dissolved gas concentrations are likely overestimated due to effervescence during sampling.
(-) below detection limit for isotopes and dissolved gases
n/a headpsace not present in sample and therefore He not analyzed

Table A1: Groundwater Quality Summary Table

Well ID		EERI-24	EERI-25	EERI-25	EERI-25	EERI-25	EERI-26	EERI-26	EERI-26	EERI-26	EERI-28	EERI-28	EERI-28	EERI-28	EERI-29	EERI-29
Sample ID		**EER1-24**	**EERI_25_1**	**EERI_25_2**	**EERI-25MM**	**EERI-25**	**EERI_26_1**	**EERI_26_2**	**EERI-26MM**	**EERI-26**	**EERI_28_1**	**EERI_28_2**	**EERI-28MM**	**EERI-28**	**EERI_29_1**	**EERI_29_2**
Date Sampled		27-Aug-2024	2-Oct-2019	16-Jul-2020	1-Aug-2021	23-Aug-2024	3-Oct-2019	18-Jul-2020	1-Aug-2021	14-Aug-2024	29-Sep-2019	23-Jul-2020	1-Aug-2021	28-Aug-2024	30-Sep-2019	19-Jul-2020
Analyte	**Units**															
Field Results																
Temperature	°C	14.5	8.5	8.2	10.3	6.7	8.3	8.8	12.6	8.9	7.8	9.7	9.8	8.4	8.2	10.2
pH		13.01	7.02	6.69	6.30	7.07	7.39	7.59	7.54		7.83	8.33	8.05	8.57	7.45	6.97
Conductivity	µS/cm	6940	2034	1687	2311	2170	2981	2589	3426	3150	2760	n/a	5005	4460	792	849
Dissolved Oxygen	mg/L	2.7	0.61	0		1.13	0.62	14.92	0.83	1.09	1.72		0.15	4.66	2.87	0
Oxidation-Reduction Potential	mV	-58	110.3	-40.1		-65	11.7	-19.9		41	156.8			37	109.1	-30.6
Eh	mV				116				61.3				73.5			
Lab Results																
Physical Tests																
Conductivity	µS/cm	5570				2240				3270				4920		
Alkalinity (as HCO3)	mg/L		610	723	797		1833	1951	2037		735	992	1098		504	698
Alkalinity, bicarbonate (as CaCO3)	mg/L	<5.0				593				1700				824		
Alkalinity, carbonate (as CaCO3)	mg/L	363				<1.0				<1.0				56.8		
Alkalinity, hydroxide (as CaCO3)	mg/L	1250				<1.0				<1.0				<1.0		
Alkalinity, total (as CaCO3)	mg/L	1610				593				1700				880		
Hardness (as CaCO3), dissolved	mg/L	577				946				76.5				99.8		
Solids, total dissolved [TDS], calculated	mg/L	1760				1740				2160				3480		
pH	pH units	12.8				8.06				8.16				8.60		
Anions and Nutrients																
Ammonia (NH4)	mg/L			1.72				0.52				2.4				0
Ammonia, total (as N)	mg/L	19.8				1.72				2.94				3.62		
Bromide	mg/L		0.00				0.37	0.47	0.89		0.00				0.00	
Chloride	mg/L	<25.0	11.15	4.84	25.34	11.0	20.67	7.04	18.97	14.4	7.74	9.25	31.38	14.5	1.96	0.59
Fluoride	mg/L	<1.00	0.85	0.48		0.407	1.15	0.46	0.72	<0.400	0.65	0.75		<0.400	0.42	0.24
Nitrate (as NO3)	mg/L		0.00	1.30	1.13		8.23	8.45			0.00		4.71		2.22	2.43
Nitrate (as N)	mg/L	<0.250				<0.100				<0.100				<0.100		
Nitrate + Nitrite (as N)	mg/L	<0.255				<0.102				<0.102				<0.102		
Nitrite (as N)	mg/L	0.0641				<0.0200				<0.0200				<0.0200		
Phosphate (as PO4)	mg/L	<0.100	0.00	1.68		<0.0010	0.00			<0.0010	0.00			<0.0010	0.00	
Sulfate (as SO4)	mg/L	<15.0	929	769	1113	794	488	300	276	255	1754	1734	2012	1720	133	114
Organic / Inorganic Carbon																
Carbon, dissolved inorganic [DIC]	mg/L	20.9				165				506				212		
Ion Balance																
Anion sum	meq/L	32.2				28.7				39.7				53.8		
Cation sum	meq/L	35.9				29.4				37.9				53.3		
Ion balance (APHA)	%	5.43				1.20				-2.32				-0.47		
Ion balance (cations/anions)	%	111				102				95.5				99.1		
Dissolved Metals																
Aluminum, dissolved	mg/L	0.100	0.007350	0.002785	6.559800	0.0014	0.019015	0.005171	7.557280	0.0052	0.025791	0.032694	35.852000	0.0387	0.008612	0.000667
Antimony, dissolved	mg/L	0.00068	0.000158	0.000032	0.000039	<0.00010	0.000567	0.000206	0.000030	<0.00050	0.006272	0.000077	0.000105	<0.00050	0.000184	0.000071
Arsenic, dissolved	mg/L	0.00874	0.001994	0.002458	0.005391	0.00343	0.001036	0.000477	0.000293	0.00099	0.002673	0.000876	0.001135	<0.00050	0.000765	0.000556
Barium, dissolved	mg/L	0.603	0.026566	0.012893	0.025045	0.00973	0.083415	0.030857	0.019858	0.0289	0.031021	0.058747	0.133394	0.0324	0.056543	0.043514
Beryllium, dissolved	mg/L	<0.000020	0.000001	0.000034		<0.000020	0.000007	0.000068		<0.000100	0.000004	0.000068	0.056800	<0.000100	0.000004	0.000017
Bismuth, dissolved	mg/L	<0.000050	0.000004	0.000008	0.000002	<0.000050	0.000013	0.000013	0.000007	<0.000250	0.000015	0.000012	0.000019	<0.000250	0.000002	0.000004
Boron, dissolved	mg/L	0.156	0.33	0.41	0.83	0.473	0.48	0.60	0.62	0.564	0.60	0.95	2.61	0.948	0.15	0.21
Cadmium, dissolved	mg/L	<0.0000050	0.000023	0.000004		<0.0000050	0.000021	0.000007		<0.0000250	0.000036	0.000007		<0.0000250	0.000081	0.000007
Calcium, dissolved	mg/L	231	210.87	199.74	431.84	230	29.80	25.70	24.95	17.5	22.86	22.69	57.07	24.3	61.58	71.86
Cesium, dissolved	mg/L	0.000073	0.000035	0.000035	0.000014	<0.000010	0.000066	0.000013	0.000124	0.000086	0.000096	0.000016	0.000205	0.000069	0.000046	0.000001
Chromium, dissolved	mg/L	0.00107	0.001920	0.002873	0.005477	<0.00050	0.005157	0.005743	0.005939	<0.00250	0.004879	0.005487	0.014775	<0.00250	0.000331	0.000138
Cobalt, dissolved	mg/L	0.00048	0.001723	0.001844	0.005340	0.00256	0.000601	0.000294	0.000000	<0.00050	0.000345	0.000087	0.000294	<0.00050	0.001042	0.000977
Copper, dissolved	mg/L	0.0105	0.000662	0.000103	0.000477	<0.00020	0.001010	0.000206	0.000466	<0.00100	0.000874	0.000793	0.000696	<0.00100	0.000585	0.000051
Iron, dissolved	mg/L	0.017	0.74	3.73	8.09	4.12	0.05	0.70	4.06	<0.050	0.08	0.12	0.66	0.191	0.04	0.00
Lead, dissolved	mg/L	0.00541	0.000076	0.000015	0.000036	<0.000050	0.000249	0.000074	0.000046	<0.000250	0.000404	0.000057	0.000121	<0.000250	0.000072	0.000016
Lithium, dissolved	mg/L	0.0611	0.068101	0.080407	0.167331	0.0998	0.250335	0.289938	0.288719	0.325	0.064347	0.077437	0.209922	0.0881	0.008598	0.013154
Magnesium, dissolved	mg/L	0.0222	78.57	83.33	165.71	90.4	12.89	13.21	11.67	7.97	8.12	8.28	20.76	9.49	34.16	47.86
Manganese, dissolved	mg/L	0.00100	0.31	0.44	0.79	0.403	0.10	0.06	0.06	0.0699	0.03	0.03	0.09	0.0342	0.41	0.94

Table A1: Groundwater Quality Summary Table

Well ID		EERI-24	EERI-25	EERI-25	EERI-25	EERI-25	EERI-26	EERI-26	EERI-26	EERI-26	EERI-28	EERI-28	EERI-28	EERI-28	EERI-29	EERI-29
Sample ID		**EER1-24**	**EERI_25_1**	**EERI_25_2**	**EERI-25MM**	**EERI-25**	**EERI_26_1**	**EERI_26_2**	**EERI-26MM**	**EERI-26**	**EERI_28_1**	**EERI_28_2**	**EERI-28MM**	**EERI-28**	**EERI_29_1**	**EERI_29_2**
Date Sampled		27-Aug-2024	2-Oct-2019	16-Jul-2020	1-Aug-2021	23-Aug-2024	3-Oct-2019	18-Jul-2020	1-Aug-2021	14-Aug-2024	29-Sep-2019	23-Jul-2020	1-Aug-2021	28-Aug-2024	30-Sep-2019	19-Jul-2020
Mercury, dissolved	mg/L	<0.0000050				<0.0000050				<0.0000050				<0.0000050		
Molybdenum, dissolved	mg/L	0.0160	0.000977	0.000327	0.000620	0.000262	0.002273	0.001063	0.000283	0.00230	0.011082	0.001848	0.002013	0.00116	0.001967	0.002824
Nickel, dissolved	mg/L	0.00636	0.002647	0.002290	0.007557	0.00177	0.002816	0.002030	0.000461	0.00336	0.002188	0.001647	0.002892	<0.00250	0.001669	0.002040
Phosphorus, dissolved	mg/L	<0.050				<0.050				<0.250				<0.250		
Potassium, dissolved	mg/L	7.18	7.08	5.93	12.56	6.61	5.30	4.24	4.79	4.46	4.18	3.46	10.32	4.63	2.82	2.45
Rubidium, dissolved	mg/L	0.00556			0.002926	0.00141			0.003736	0.00357			0.007712	0.00322		
Selenium, dissolved	mg/L	0.000456	0.000554	0.000162		<0.000050	0.000390	0.000199		0.000381	0.000463	0.000274		<0.000250	0.001986	0.000174
Silicon, dissolved	mg/L	1.30	4.44	4.97	10.61	6.33	2.45	2.22	2.38	2.99	2.30	2.28	6.57	3.26	3.44	4.70
Silver, dissolved	mg/L	<0.000010				<0.000010				<0.000050				<0.000050		
Sodium, dissolved	mg/L	522	214.39	217.80	439.85	232	813.86	817.03	797.29	828	889.84	1074.00	2846.89	1170	83.02	141.47
Strontium, dissolved	mg/L	1.97	0.99	1.05	2.37	1.20	0.59	0.63	0.73	0.524	0.55	0.73	2.06	0.846	0.48	0.62
Sulfur, dissolved	mg/L	4.95	215.43	227.31	555.40	293	97.37	100.56	118.69	92.8	450.81	501.40	1539.13	648	28.75	36.88
Tellurium, dissolved	mg/L	<0.00020				<0.00020				<0.00100				<0.00100		
Thallium, dissolved	mg/L	<0.000010	0.000028	0.000005		<0.000010	0.000016	0.000063		<0.000050	0.000006	0.000009		<0.000050	0.000020	0.000009
Thorium, dissolved	mg/L	<0.00010	0.000002	0.000002		<0.00010	0.000005	0.000005		<0.00050	0.000008	0.000005	0.000040	<0.00050	0.000003	0.000001
Tin, dissolved	mg/L	0.00036	0.000102	0.000071		<0.00010	0.000340	0.000261		<0.00050	0.000285	0.000175		<0.00050	0.000055	0.000075
Titanium, dissolved	mg/L	<0.00030	0.000295	0.000122		<0.00030	0.000295	0.000243		<0.00150	0.000837	0.000248		<0.00150	0.000816	0.000061
Tungsten, dissolved	mg/L	0.00389				<0.00010				<0.00050				0.00118		
Uranium, dissolved	mg/L	<0.000010	0.010636	0.006582	0.015388	0.00867	0.001371	0.000160	0.000058	0.000163	0.000671	0.000103	0.000182	<0.000050	0.006700	0.006139
Vanadium, dissolved	mg/L	0.00222	0.000193	0.000078	0.000092	<0.00050	0.000396	0.000107	0.000062	<0.00250	0.000447	0.000295	0.000260	<0.00250	0.000238	0.000009
Zinc, dissolved	mg/L	0.711	0.004639	0.003997	0.031142	0.0018	0.007305	0.354343	0.022179	0.0142	0.005354	0.002024	0.046019	0.0053	0.005713	0.875704
Zirconium, dissolved	mg/L	<0.00030	0.000230	0.000136	0.000215	<0.00030	0.003873	0.002327	0.001699	0.00304	0.001057	0.001073	0.002625	<0.00100	0.000196	0.000018
Isotopes																
$d^{13}C$ - DIC	‰ VPDB	-11.1				-10.8				-6.5				-7.1		
$d^{2}H$	‰ VSMOW	-186.9			-168.1	-171.9			-164.3	-167.6			-176.5	-181.1		
$d^{18}O$	‰ VSMOW	-24.0			-21.3	-22.1			-20.8	-21.5			-22.2	-23.1		
$\delta^{13}C_{CO2}$	‰ VPDB	-		-23.0		-19.0		-17.9		-15.35		-18.0		-15.4		-20.1
$\delta^{13}C_{CH4}$	‰ VPDB	-80.7		-45.3		-		-38.5		-		-48.3		-		
$\delta^{2}H_{CH4}$	‰ VSMOW	-				-				-				-		
Dissolved Gases																
CH_4	ppm	-	0.004	0.013		0.047	0.117	0.028		0.097	0.025	0.027		-	0.004	0.004
C_2H_6	ppm	-	0.0003	0.0009		-	0.0027	0.0012		-	0.0006	0.0003		-	0.0012	0.0009
C_3H_8	ppm	-	0.0004	0.0004		-	0.0008	0.0008		-	0.0000	0.0000		-	0.0004	0.0004
He	ppm or %v/v for 2024 results	0.01				0.03				0.03				<0.01		
O_2	ppm	20.27	1.45	1.92		20.77	1.06	1.47		18.31	2.33	1.55		20.80	3.61	1.19
N_2	ppm	-	43.39	50.95		913.44	29.42	26.54		277.12	35.75	34.58		-	27.47	42.22
CO_2	ppm	-	115.35	142.82		156.56	68.43	71.13		95.92	7.78	9.21		-	22.44	77.43

1-EERI 9 dissolved gas concentrations are likely overestimated due to effervescence during sampling.
(-) below detection limit for isotopes and dissolved gases
n/a headpsace not present in sample and therefore He not analyzed

Appendix B

Laboratory Reports

BC OGRIS 2024 Groundwater Sampling
WWAL Ref: 24-065-01PG

CERTIFICATE OF ANALYSIS

Work Order	: **FJ2402448**		
Amendment	: **1**		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Vancouver
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 541 1030	Telephone	: +1 604 253 4188
Project	: 24-065-01PG	Date Samples Received	: 19-Aug-2024 08:00
PO	: ----	Date Analysis Commenced	: 24-Aug-2024
C-O-C number	: ----	Issue Date	: 20-Dec-2024 17:15
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program		
Quote number	: VA24-WESW100-001		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Daniel Shabestani	Lab Assistant	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Ghazaleh Khanmirzaei	Analyst	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	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 units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.

Workorder Comments

Amendment (20/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data. Orthophosphate was added to FJ2402448 -1, -2, -3 and -4.

Qualifiers

Qualifier	Description
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).

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-2	EERI-10	EERI-9	EERI-22	----
					Client sampling date / time	17-Aug-2024 11:00	17-Aug-2024 13:30	17-Aug-2024 16:40	18-Aug-2024 12:00	----
						FJ2402448-001	FJ2402448-002	FJ2402448-003	FJ2402448-004	----
						Result	Result	Result	Result	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		563	1400	1100	324	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		111	55.0	<1.0	<1.0	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		674	1460	1100	324	----
Conductivity	----	E100/VA	2.0	µS/cm		1570	4330	5400	583	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		105	148	3700	310	----
pH	----	E108/VA	0.10	pH units		9.10	8.48	6.82	8.01	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		1320	3070	5330	346	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		4.89	3.93	2.56	0.159	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		6.72	<10.0 DLDS	<10.0 DLDS	<0.50	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		0.578	0.424	0.995	0.171	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		0.0576	<0.100 DLDS	<0.100 DLDS	<0.0050	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		0.0576	<0.102	<0.102	<0.0051	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0100 DLDS	<0.0200 DLDS	<0.0200 DLDS	<0.0010	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		0.0566	<0.0010	<0.0010	<0.0010	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		208	1060	3250	15.3	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		156	372	322	86.1	----
Ion Balance										
Anion sum	----	EC101/VA	0.10	meq/L		18.0	51.3	89.7	6.80	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-2	EERI-10	EERI-9	EERI-22	----
					Client sampling date / time	17-Aug-2024 11:00	17-Aug-2024 13:30	17-Aug-2024 16:40	18-Aug-2024 12:00	----
						FJ2402448-001	FJ2402448-002	FJ2402448-003	FJ2402448-004	----
						Result	Result	Result	Result	----
Ion Balance										
Cation sum	----	EC101/VA	0.10	meq/L		30.7	49.9	86.6	6.65	----
Ion balance (cations/anions)	----	EC101/VA	0.010	%		170	97.3	96.5	97.8	----
Ion balance (APHA)	----	EC101/VA	0.01	%		26.1	-1.38	-1.76	-1.12	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.0068	0.0073	0.0111	<0.0010	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		0.00021	<0.00050 DLA	<0.00050 DLA	<0.00010	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00704	0.00066	0.00483	0.00259	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.0546	0.00747	0.00560	0.146	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000040 DLA	<0.000100 DLA	<0.000100 DLA	<0.000020	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000100 DLA	<0.000250 DLA	<0.000250 DLA	<0.000050	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.699	0.748	0.558	0.034	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000100 DLA	<0.0000250 DLA	<0.0000250 DLA	<0.0000050	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		24.7	22.4	516	86.6	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		0.000035	0.000148	<0.000050 DLA	<0.000010	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00100 DLA	<0.00250 DLA	<0.00250 DLA	<0.00050	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00027	<0.00050 DLA	0.0293	0.00023	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		<0.00040 DLA	<0.00100 DLA	<0.00100 DLA	<0.00020	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		0.094	0.372	18.4	1.05	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000100 DLA	<0.000250 DLA	<0.000250 DLA	<0.000050	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.184	0.537	0.286	0.0112	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		10.6	22.3	585	22.9	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-2	EERI-10	EERI-9	EERI-22	----
					Client sampling date / time	17-Aug-2024 11:00	17-Aug-2024 13:30	17-Aug-2024 16:40	18-Aug-2024 12:00	----
						FJ2402448-001	FJ2402448-002	FJ2402448-003	FJ2402448-004	----
						Result	Result	Result	Result	----
Dissolved Metals										
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.0264	0.0103	2.26	0.431	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.00468	0.000839	0.00119	0.00208	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		0.00307	<0.00250 DLA	0.0273	0.00065	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		0.327	<0.250 DLA	<0.250 DLA	<0.050	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		4.19	5.07	7.77	2.14	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00324	0.00450	0.00475	0.00068	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		<0.000100 DLA	<0.000250 DLA	<0.000250 DLA	<0.000050	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		3.68	2.81	9.28	5.59	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000020 DLA	<0.000050 DLA	<0.000050 DLA	<0.000010	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		646	1070	266	7.45	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.421	0.857	0.774	0.370	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		111	382	1190	5.26	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00040 DLA	<0.00100 DLA	<0.00100 DLA	<0.00020	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000020 DLA	<0.000050 DLA	<0.000050 DLA	<0.000010	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00020 DLA	<0.00050 DLA	<0.00050 DLA	<0.00010	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00020 DLA	<0.00050 DLA	<0.00050 DLA	<0.00010	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00060 DLA	<0.00150 DLA	<0.00150 DLA	<0.00030	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		0.00033	<0.00050 DLA	<0.00050 DLA	<0.00010	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.00103	0.000081	0.00732	0.00189	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		0.00277	<0.00250 DLA	<0.00250 DLA	<0.00050	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-2	EERI-10	EERI-9	EERI-22	----
					Client sampling date / time	17-Aug-2024 11:00	17-Aug-2024 13:30	17-Aug-2024 16:40	18-Aug-2024 12:00	----
						FJ2402448-001	FJ2402448-002	FJ2402448-003	FJ2402448-004	----
						Result	Result	Result	Result	----
Dissolved Metals										
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0040	0.0179	0.0276	0.0114	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L		<0.00180 DLM	0.00163	<0.00100 DLA	<0.00030	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	Field	Field	Field	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	Field	Field	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	see attached	see attached	see attached	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	See attached	See attached	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	See attached	See attached	----

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

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402448**	Page	: 1 of 15
Amendment	: 1		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 19-Aug-2024 08:00
PO	: ----	Issue Date	: 20-Dec-2024 17:14
C-O-C number	: ----		
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- Method Blank value 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
Method Blank (MB) Values								
Anions and Nutrients	QC-MRG6-1614248 001	----	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0017 mg/L B	0.001 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Matrix Spike (MS) Recoveries								
Dissolved Metals	Anonymous	Anonymous	Silver, dissolved	7440-22-4	E421	51.6 % MS-Ag	70.0-130%	Recovery less than lower data quality objective

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group : Analytical Method / 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) EERI-22	E298	18-Aug-2024	24-Aug-2024	28 days	6 days	✓	25-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EERI-10	E298	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	25-Aug-2024	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EERI-2	E298	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	25-Aug-2024	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EERI-9	E298	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	25-Aug-2024	28 days	8 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-22	E235.Cl	18-Aug-2024	24-Aug-2024	28 days	6 days	✓	24-Aug-2024	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-10	E235.Cl	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-2	E235.Cl	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-9	E235.Cl	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-9	E378-U	17-Aug-2024	20-Dec-2024	48 hrs	2994 hrs	× EHTL	20-Dec-2024	48 hrs	2996 hrs	× EHTL
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-10	E378-U	17-Aug-2024	20-Dec-2024	51 hrs	2997 hrs	× EHTL	20-Dec-2024	51 hrs	2999 hrs	× EHTL
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-22	E378-U	18-Aug-2024	20-Dec-2024	52 hrs	2974 hrs	× EHT	20-Dec-2024	52 hrs	2977 hrs	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-2	E378-U	17-Aug-2024	20-Dec-2024	53 hrs	2999 hrs	× EHTL	20-Dec-2024	53 hrs	3002 hrs	× EHTL
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-22	E235.F	18-Aug-2024	24-Aug-2024	28 days	6 days	✓	24-Aug-2024	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-10	E235.F	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-2	E235.F	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-9	E235.F	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 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 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 EERI-22	E235.NO3-L	18-Aug-2024	24-Aug-2024	3 days	6 days	× EHT	24-Aug-2024	3 days	6 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-10	E235.NO3-L	17-Aug-2024	24-Aug-2024	3 days	7 days	× EHT	24-Aug-2024	3 days	7 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-2	E235.NO3-L	17-Aug-2024	24-Aug-2024	3 days	7 days	× EHT	24-Aug-2024	3 days	7 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-9	E235.NO3-L	17-Aug-2024	24-Aug-2024	3 days	7 days	× EHT	24-Aug-2024	3 days	7 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-22	E235.NO2-L	18-Aug-2024	24-Aug-2024	3 days	6 days	× EHT	24-Aug-2024	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-10	E235.NO2-L	17-Aug-2024	24-Aug-2024	3 days	7 days	× EHT	24-Aug-2024	3 days	7 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-2	E235.NO2-L	17-Aug-2024	24-Aug-2024	3 days	7 days	× EHT	24-Aug-2024	3 days	7 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-9	E235.NO2-L	17-Aug-2024	24-Aug-2024	3 days	7 days	× EHT	24-Aug-2024	3 days	7 days	× EHT
Anions and Nutrients : Sulfate in Water by IC										
HDPE EERI-22	E235.SO4	18-Aug-2024	24-Aug-2024	28 days	6 days	✓	24-Aug-2024	28 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
EERI-10	E235.SO4	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
EERI-2	E235.SO4	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
EERI-9	E235.SO4	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
EERI-10	E509	17-Aug-2024	27-Aug-2024	28 days	10 days	✓	27-Aug-2024	28 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
EERI-2	E509	17-Aug-2024	27-Aug-2024	28 days	10 days	✓	27-Aug-2024	28 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
EERI-9	E509	17-Aug-2024	27-Aug-2024	28 days	10 days	✓	27-Aug-2024	28 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
EERI-22	E509	18-Aug-2024	27-Aug-2024	28 days	9 days	✓	27-Aug-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
EERI-10	E421	17-Aug-2024	27-Aug-2024	180 days	10 days	✓	29-Aug-2024	180 days	12 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
EERI-2	E421	17-Aug-2024	27-Aug-2024	180 days	10 days	✓	29-Aug-2024	180 days	12 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										
HDPE - dissolved (lab preserved) EERI-9	E421	17-Aug-2024	27-Aug-2024	180 days	10 days	✓	29-Aug-2024	180 days	12 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EERI-22	E421	18-Aug-2024	27-Aug-2024	180 days	9 days	✓	29-Aug-2024	180 days	11 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-10	E353-L	17-Aug-2024	----	----	----		27-Aug-2024	14 days	10 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-2	E353-L	17-Aug-2024	----	----	----		27-Aug-2024	14 days	10 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-9	E353-L	17-Aug-2024	----	----	----		27-Aug-2024	14 days	10 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-22	E353-L	18-Aug-2024	----	----	----		27-Aug-2024	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-22	E290	18-Aug-2024	24-Aug-2024	14 days	6 days	✓	24-Aug-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-10	E290	17-Aug-2024	24-Aug-2024	14 days	7 days	✓	24-Aug-2024	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-2	E290	17-Aug-2024	24-Aug-2024	14 days	7 days	✓	24-Aug-2024	14 days	7 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-9	E290	17-Aug-2024	24-Aug-2024	14 days	7 days	✓	24-Aug-2024	14 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-22	E100	18-Aug-2024	24-Aug-2024	28 days	6 days	✓	24-Aug-2024	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-10	E100	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-2	E100	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-9	E100	17-Aug-2024	24-Aug-2024	28 days	7 days	✓	24-Aug-2024	28 days	7 days	✓
Physical Tests : pH by Meter										
HDPE EERI-22	E108	18-Aug-2024	24-Aug-2024	0.25 hrs	139 hrs	× EHTR-FM	24-Aug-2024	0.25 hrs	141 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EERI-9	E108	17-Aug-2024	24-Aug-2024	0.25 hrs	158 hrs	× EHTR-FM	24-Aug-2024	0.25 hrs	161 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EERI-10	E108	17-Aug-2024	24-Aug-2024	0.25 hrs	161 hrs	× EHTR-FM	24-Aug-2024	0.25 hrs	164 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EERI-2	E108	17-Aug-2024	24-Aug-2024	0.25 hrs	164 hrs	× EHTR-FM	24-Aug-2024	0.25 hrs	166 hrs	× EHTR-FM

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container EERI-22	C-13 DIC	18-Aug-2024	----	----	----		16-Dec-2024	----	120 days	
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container EERI-10	C-13 DIC	17-Aug-2024	----	----	----		16-Dec-2024	----	121 days	
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container EERI-2	C-13 DIC	17-Aug-2024	----	----	----		16-Dec-2024	----	121 days	
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container EERI-9	C-13 DIC	17-Aug-2024	----	----	----		16-Dec-2024	----	121 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container EERI-22	H-2+O-18	18-Aug-2024	----	----	----		16-Dec-2024	----	120 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container EERI-10	H-2+O-18	17-Aug-2024	----	----	----		16-Dec-2024	----	121 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container EERI-2	H-2+O-18	17-Aug-2024	----	----	----		16-Dec-2024	----	121 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container EERI-9	H-2+O-18	17-Aug-2024	----	----	----		16-Dec-2024	----	121 days	

Legend & Qualifier Definitions

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	1614256	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1614249	1	18	5.5	5.0	✓
Conductivity in Water	E100	1614255	1	18	5.5	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1619759	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1618518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1618390	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614252	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614250	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614251	1	18	5.5	5.0	✓
pH by Meter	E108	1614254	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1614248	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1614256	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1614249	1	18	5.5	5.0	✓
Conductivity in Water	E100	1614255	1	18	5.5	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1619759	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1618518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1618390	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614252	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614250	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614251	1	18	5.5	5.0	✓
pH by Meter	E108	1614254	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1614248	1	18	5.5	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1614256	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1614249	1	18	5.5	5.0	✓
Conductivity in Water	E100	1614255	1	18	5.5	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1619759	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1618518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1618390	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*
Method Blanks (MB) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614252	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614250	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614251	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1614248	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1614249	1	18	5.5	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1619759	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1618518	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1618390	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614252	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614250	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614251	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1614248	1	18	5.5	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
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18	Water		See attached report.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1			

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **FJ2402448**	Page	: 1 of 12
Amendment	: **1**		
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 19-Aug-2024 08:00
PO	: ----	Date Analysis Commenced	: 24-Aug-2024
C-O-C number	: ----	Issue Date	: 20-Dec-2024 17:14
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Daniel Shabestani	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Ghazaleh Khanmirzaei	Analyst	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	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: 1614254)											
FJ2402448-003	EERI-9	pH	----	E108	0.10	pH units	6.82	6.88	0.876%	4%	----
Physical Tests (QC Lot: 1614255)											
FJ2402448-003	EERI-9	Conductivity	----	E100	2.0	µS/cm	5400	5390	0.185%	10%	----
Physical Tests (QC Lot: 1614256)											
FJ2402448-003	EERI-9	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	1100	1100	0.292%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	1100	1100	0.292%	20%	----
Anions and Nutrients (QC Lot: 1614248)											
VA24C1467-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	7.39	7.53	1.86%	20%	----
Anions and Nutrients (QC Lot: 1614249)											
VA24C1467-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	7.80	7.94	1.84%	20%	----
Anions and Nutrients (QC Lot: 1614250)											
VA24C1467-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1614251)											
VA24C1467-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1614252)											
VA24C1467-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.046	0.048	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1614677)											
FJ2402439-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	1.03	1.04	0.990%	20%	----
Anions and Nutrients (QC Lot: 1818198)											
FJ2402387-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1619759)											
FJ2402439-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	5.00	mg/L	195	189	3.05%	20%	----
Dissolved Metals (QC Lot: 1618390)											
FJ2402439-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.293	0.295	0.651%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00019	0.00018	0.000001	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00404	0.00392	2.94%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0693	0.0684	1.29%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1618390) - continued											
FJ2402439-001	Anonymous	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	0.283	0.287	1.45%	20%	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	24.7	25.5	3.44%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000042	0.000045	0.000004	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.030	0.029	0.0010	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	0.0092	0.0094	0.0003	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	7.29	7.06	3.18%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0138	0.0132	5.00%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00463	0.00436	5.94%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.99	1.96	1.67%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00150	0.00141	0.00009	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000161	0.000158	0.000003	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.33	5.27	1.11%	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	408	386	5.58%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.168	0.157	6.51%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	51.8	50.0	3.42%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00418	0.00407	2.64%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00060	0.00060	0.000003	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0042	0.0041	0.00009	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1618518)											
FJ2402448-001	EERI-2	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1614255)						
Conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 1614256)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1614248)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1614249)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1614250)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1614251)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	# 0.0017	B
Anions and Nutrients (QCLot: 1614252)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1614677)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1818198)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 1619759)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1618390)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1618390) - continued						
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1618518)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1614254)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1614255)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	99.7	90.0	110	----
Physical Tests (QCLot: 1614256)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 1614248)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1614249)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1614250)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1614251)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.3	90.0	110	----
Anions and Nutrients (QCLot: 1614252)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.6	90.0	110	----
Anions and Nutrients (QCLot: 1614677)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 1818198)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1619759)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	98.0	80.0	120	----
Dissolved Metals (QCLot: 1618390)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	96.9	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	106	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.3	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	99.7	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.8	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1618390) - continued									
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.8	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.9	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.9	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	94.6	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	99.5	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	106	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	98.8	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	96.9	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	105	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	98.5	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	98.7	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	100	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	94.9	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	95.3	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	100	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	95.1	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.1	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	98.6	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	99.5	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.3	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	99.6	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	96.5	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	90.6	80.0	120	----

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: 1614248)										
VA24C1467-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	105 mg/L	100 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 1614249)										
VA24C1467-002	Anonymous	Chloride	16887-00-6	E235.Cl	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 1614250)										
VA24C1467-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.60 mg/L	2.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 1614251)										
VA24C1467-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.502 mg/L	0.5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 1614252)										
VA24C1467-002	Anonymous	Fluoride	16984-48-8	E235.F	1.04 mg/L	1 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 1614677)										
FJ2402439-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1818198)										
FJ2402417-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0319 mg/L	0.03 mg/L	106	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1619759)										
FJ2402448-001	EERI-2	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1618390)										
FJ2402439-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.196 mg/L	0.2 mg/L	97.8	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0406 mg/L	0.04 mg/L	101	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00869 mg/L	0.01 mg/L	86.9	70.0	130	----
		Boron, dissolved	7440-42-8	E421	ND mg/L	----	ND	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00375 mg/L	0.004 mg/L	93.7	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00994 mg/L	0.01 mg/L	99.4	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0388 mg/L	0.04 mg/L	97.1	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0183 mg/L	0.02 mg/L	91.7	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0173 mg/L	0.02 mg/L	86.5	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.83 mg/L	2 mg/L	91.6	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0211 mg/L	0.02 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: 1618390) - continued										
FJ2402439-002	Anonymous	Nickel, dissolved	7440-02-0	E421	0.0356 mg/L	0.04 mg/L	88.9	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	11.4 mg/L	10 mg/L	114	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	4.10 mg/L	4 mg/L	102	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0369 mg/L	0.04 mg/L	92.2	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	10.1 mg/L	10 mg/L	101	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00206 mg/L	0.004 mg/L	51.6	70.0	130	MS-Ag
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	----	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00359 mg/L	0.004 mg/L	89.8	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0171 mg/L	0.02 mg/L	85.7	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0384 mg/L	0.04 mg/L	96.1	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00383 mg/L	0.004 mg/L	95.7	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.355 mg/L	0.4 mg/L	88.8	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0423 mg/L	0.04 mg/L	106	70.0	130	----
Dissolved Metals (QCLot: 1618518)										
FJ2402448-002	EERI-10	Mercury, dissolved	7439-97-6	E509	0.0000947 mg/L	0 mg/L	94.7	70.0	130	----

Qualifiers

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

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page of

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Environmental Division
Fort St. John
Work Order Reference
FJ2402448

Telephone : +1 250 261 5517

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax amanda@westernwater.ca
Email 2 warren@westernwater.ca

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges app
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharg
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharg
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharg
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharg
☐ Same day [E2] if received by 10am M-S - 200% rush st
Additional fees may apply to rush requests on w
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, p

Project Information		Oil and Gas Required Fields (client use)	
ALS Client Code / QUOTE #:	VA24-WESW100-001	AFE/Cost Center:	PO#
Job / Project #:	24-065-01PG	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact: Ian Chen	Sampler: AB

Analysis

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

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	major and minor cations	[illegible]	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4)	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	Isotopes	pH	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	EFR1-2	17-Aug-24	11:00	GW		X		X	X	X	X	X	X	X	X	X	X			
	EFR1-10	17-Aug-24	13:30	GW		X		X	X	X	X	X	X	X	X	X	X			
	EFR1-9	17-Aug-24	16:40	GW		X		X	X	X	X	X	X	X	X	X	X			
	EFR1-22	18-Aug-24	12:00	GW		X		X	X	X	X	X	X	X	X	X	X			

FJAE Shipping & Receiving
___ Call Out ___ Expedite
___ Priority
1 # of Coolers ✓ Air
___ # of Carboys ___ Ground

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

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

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

dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane), and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
4.8				10			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	Aug 19/24	7:30		Aug 19/24	7:30		Aug 19	

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2022 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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25011**
Client Project ID:	**FJ2402448**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0094	FJ2402448-001	EERI-2	17-Aug-24	22-Aug-24	Dissolved Gas	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	1.27		<0.01	<0.01	21.60	77.13	100.0
IB-25-0095	FJ2402448-002	EERI-10	17-Aug-24	22-Aug-24	Dissolved Gas	0.044	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	2.24		<0.01	<0.01	15.45	82.26	100.0
IB-25-0096	FJ2402448-003	EERI-9	17-Aug-24	22-Aug-24	Dissolved Gas	74.8	4.85	0.883	0.097	0.109	0.001	0.015	0.006	0.001	<0.001	8.78		0.01	<0.01	1.50	8.98	100.0
IB-25-0097	FJ2402448-004	EERI-22	18-Aug-24	22-Aug-24	Dissolved Gas	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.91		<0.01	<0.01	20.24	78.84	100.0

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25011**
Client Project ID:	**FJ2402448**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes												
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0094	FJ2402448-001	EERI-2	0.012				31.54	402.37								-24.6							
IB-25-0095	FJ2402448-002	EERI-10	0.050				43.11	142.84								-20.5							
IB-25-0096	FJ2402448-003	EERI-9	404.773	50.112	13.226	1.861	271.96	82.85	-42.4	-29.6	-27.1					-16.2	-221	-190	-202				
IB-25-0097	FJ2402448-004	EERI-22	0.006				25.58	575.01								-19.1							

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25011**
Client Project ID:	**FJ2402448**

ISOBRINE solutions

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0094	FJ2402448-001	EERI-2		Headspace present; EPA method RSKSOP-175 not used.
IB-25-0095	FJ2402448-002	EERI-10		Headspace present; EPA method RSKSOP-175 not used.
IB-25-0096	FJ2402448-003	EERI-9		Headspace present; EPA method RSKSOP-175 not used.
IB-25-0097	FJ2402448-004	EERI-22		Headspace present; EPA method RSKSOP-175 not used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25011**
Client File No:	**FJ2402448**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0094	FJ2402448-001	EERI-2	17-Aug-24	22-Aug-24	-22.2	0.02	-175	0.01	-16.2	
IB-25-0095	FJ2402448-002	EERI-10	17-Aug-24	22-Aug-24	-23.0	0.01	-179	0.10	-12.7	
IB-25-0096	FJ2402448-003	EERI-9	17-Aug-24	22-Aug-24	-25.3	0.03	-197	0.04	-9.4	
IB-25-0097	FJ2402448-004	EERI-22	18-Aug-24	22-Aug-24	-21.3	0.03	-166	0.15	-11.3	

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

CERTIFICATE OF ANALYSIS

Work Order	: **FJ2402580**			
Amendment	: **1**			
Client	: **Western Water Associates Ltd**	Laboratory	:	ALS Environmental - Vancouver
Contact	: Warren Grafton	Account Manager	:	Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	:	8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 541 1030	Telephone	:	+1 604 253 4188
Project	: 24-065-01PG	Date Samples Received	:	27-Aug-2024 07:45
PO	: ----	Date Analysis Commenced	:	28-Aug-2024
C-O-C number	: ----	Issue Date	:	20-Dec-2024 17:24
Sampler	: A B			
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program			
Quote number	: VA24-WESW100-001			
No. of samples received	: 1			
No. of samples analysed	: 1			

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	no units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.

Workorder Comments

Amendment (20/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data. Orthophosphate was added to FJ2402580-1.

Qualifiers

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-3	----	----	----	----
					Client sampling date / time	26-Aug-2024 17:30	----	----	----	----
						FJ2402580-001	----	----	----	----
						Result	----	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		640	----	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	----	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	----	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		640	----	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm		1880	----	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		680	----	----	----	----
pH	----	E108/VA	0.10	pH units		7.35	----	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		1280	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		0.0509	----	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		<5.00 DLDS	----	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		<0.200 DLDS	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.0500 DLDS	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.0510	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0100 DLDS	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		<0.0010	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		478	----	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		160	----	----	----	----
Ion Balance										
Anion sum	----	EC101/VA	0.10	meq/L		22.7	----	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-3	----	----	----	----
					Client sampling date / time	26-Aug-2024 17:30	----	----	----	----
						FJ2402580-001	----	----	----	----
						Result	----	----	----	----
Ion Balance										
Cation sum	----	EC101/VA	0.10	meq/L		21.9	----	----	----	----
Ion balance (cations/anions)	----	EC101/VA	0.010	%		96.5	----	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%		-1.79	----	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.0016	----	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00010	----	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		<0.00010	----	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.00876	----	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000020	----	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	----	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.169	----	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		0.0000584	----	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		119	----	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		<0.000010	----	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		0.00100	----	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00022	----	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		<0.00020	----	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		0.013	----	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	----	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0092	----	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		93.1	----	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-3	----	----	----	----
					Client sampling date / time	26-Aug-2024 17:30	----	----	----	----
						FJ2402580-001	----	----	----	----
						Result	----	----	----	----
Dissolved Metals										
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.0812	----	----	----	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	----	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.00130	----	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		0.00365	----	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.050	----	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		2.93	----	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00047	----	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		0.00105	----	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		5.18	----	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	----	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		190	----	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.724	----	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		169	----	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00020	----	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	----	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00010	----	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	----	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00030	----	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		0.00033	----	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.00576	----	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00050	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	EERI-3	----	----	----	----
					Client sampling date / time	26-Aug-2024 17:30	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402580-001	----	----	----	----
						Result	----	----	----	----
Dissolved Metals										
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0019	----	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L		<0.00030	----	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	----	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	----	----	----	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	----	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----

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

alsglobal.com

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402580**	Page	: 1 of 9
Amendment	: **1**		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 27-Aug-2024 07:45
PO	: ----	Issue Date	: 20-Dec-2024 17:23
C-O-C number	: ----		
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 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) EERI-3	E298	26-Aug-2024	02-Sep-2024	28 days	7 days	✓	04-Sep-2024	28 days	8 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-3	E235.Cl	26-Aug-2024	28-Aug-2024	28 days	2 days	✓	28-Aug-2024	28 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-3	E378-U	26-Aug-2024	20-Dec-2024	71 hrs	2777 hrs	× EHT	20-Dec-2024	71 hrs	2779 hrs	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-3	E235.F	26-Aug-2024	28-Aug-2024	28 days	2 days	✓	28-Aug-2024	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-3	E235.NO3-L	26-Aug-2024	28-Aug-2024	3 days	2 days	✓	28-Aug-2024	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-3	E235.NO2-L	26-Aug-2024	28-Aug-2024	3 days	2 days	✓	28-Aug-2024	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EERI-3	E235.SO4	26-Aug-2024	28-Aug-2024	28 days	2 days	✓	28-Aug-2024	28 days	2 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* 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 (lab preserved) EERI-3	E509	26-Aug-2024	04-Sep-2024	28 days	9 days	✓	04-Sep-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EERI-3	E421	26-Aug-2024	04-Sep-2024	180 days	9 days	✓	05-Sep-2024	180 days	10 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-3	E353-L	26-Aug-2024	----	----	----		01-Sep-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-3	E290	26-Aug-2024	28-Aug-2024	14 days	2 days	✓	28-Aug-2024	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-3	E100	26-Aug-2024	28-Aug-2024	28 days	2 days	✓	28-Aug-2024	28 days	2 days	✓
Physical Tests : pH by Meter										
HDPE EERI-3	E108	26-Aug-2024	28-Aug-2024	0.25 hrs	42 hrs	✖ EHTR-FM	28-Aug-2024	0.25 hrs	43 hrs	✖ EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container EERI-3	C-13 DIC	26-Aug-2024	----	----	----		16-Dec-2024	----	112 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Amber glass vial EERI-3	H-2+O-18	26-Aug-2024	----	----	----		16-Dec-2024	----	112 days	

Legend & Qualifier Definitions

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	1621123	1	6	16.6	5.0	✓
Ammonia by Fluorescence	E298	1628903	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	1621125	1	5	20.0	5.0	✓
Conductivity in Water	E100	1621122	1	17	5.8	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633044	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1622083	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1621128	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1621126	1	5	20.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1621127	1	6	16.6	5.0	✓
pH by Meter	E108	1621121	1	9	11.1	5.0	✓
Sulfate in Water by IC	E235.SO4	1621124	1	8	12.5	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1621123	1	6	16.6	5.0	✓
Ammonia by Fluorescence	E298	1628903	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	1621125	1	5	20.0	5.0	✓
Conductivity in Water	E100	1621122	1	17	5.8	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633044	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1622083	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1621128	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1621126	1	5	20.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1621127	1	6	16.6	5.0	✓
pH by Meter	E108	1621121	1	9	11.1	5.0	✓
Sulfate in Water by IC	E235.SO4	1621124	1	8	12.5	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1621123	1	6	16.6	5.0	✓
Ammonia by Fluorescence	E298	1628903	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	1621125	1	5	20.0	5.0	✓
Conductivity in Water	E100	1621122	1	17	5.8	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633044	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1622083	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*
Method Blanks (MB) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1621128	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1621126	1	5	20.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1621127	1	6	16.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1621124	1	8	12.5	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1628903	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	1621125	1	5	20.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633044	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1622083	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1621128	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1621126	1	5	20.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1621127	1	6	16.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1621124	1	8	12.5	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
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18	Water		See attached report.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1			

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **FJ2402580**	Page	: 1 of 12
Amendment	: **1**		
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 27-Aug-2024 07:45
PO	: ----	Date Analysis Commenced	: 28-Aug-2024
C-O-C number	: ----	Issue Date	: 20-Dec-2024 17:24
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1621121)											
FJ2402589-002	Anonymous	pH	----	E108	0.10	pH units	8.36	8.36	0.00%	4%	----
Physical Tests (QC Lot: 1621122)											
FJ2402589-002	Anonymous	Conductivity	----	E100	2.0	µS/cm	1270	1280	0.943%	10%	----
Physical Tests (QC Lot: 1621123)											
FJ2402589-002	Anonymous	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	141	141	0%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	6.5	7.3	11.8%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	148	148	0.546%	20%	----
Anions and Nutrients (QC Lot: 1621124)											
FJ2402589-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	575	563	2.10%	20%	----
Anions and Nutrients (QC Lot: 1621125)											
FJ2402589-001	Anonymous	Chloride	16887-00-6	E235.Cl	2.50	mg/L	<2.50	<2.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1621126)											
FJ2402589-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1621127)											
FJ2402589-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1621128)											
FJ2402589-001	Anonymous	Fluoride	16984-48-8	E235.F	0.100	mg/L	0.209	0.207	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1628903)											
FJ2402570-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0250	mg/L	0.589	0.594	0.876%	20%	----
Anions and Nutrients (QC Lot: 1818198)											
FJ2402387-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1628803)											
FJ2402570-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	1.50	mg/L	121	122	0.546%	20%	----
Dissolved Metals (QC Lot: 1622083)											
FJ2402565-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0014	0.0014	0.00005	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00215	0.00221	2.56%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0259	0.0261	0.484%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1622083) - continued											
FJ2402565-001	Anonymous	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	0.064	0.061	0.003	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	137	133	2.36%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00073	0.00073	0.000006	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.797	0.787	1.27%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0414	0.0401	3.24%	20%	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	51.5	50.7	1.58%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.470	0.469	0.410%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00138	0.00132	4.15%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00121	0.00115	0.00006	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	6.26	6.42	2.61%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00108	0.00106	0.00002	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.24	5.16	1.57%	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	47.5	48.0	0.917%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.633	0.598	5.66%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	110	109	0.877%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00265	0.00256	3.45%	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	0.0011	<0.0010	0.00006	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1633044)											
FJ2402564-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1621122)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 1621123)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1621124)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1621125)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1621126)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1621127)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1621128)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1628903)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1818198)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 1628803)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1622083)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1622083) - continued						
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1633044)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1621121)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1621122)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	99.3	90.0	110	----
Physical Tests (QCLot: 1621123)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.7	85.0	115	----
Anions and Nutrients (QCLot: 1621124)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1621125)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1621126)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 1621127)									
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: 1621128)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1628903)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	94.4	85.0	115	----
Anions and Nutrients (QCLot: 1818198)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1628803)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	107	80.0	120	----
Dissolved Metals (QCLot: 1622083)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	94.7	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.6	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	99.0	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	96.5	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1622083) - continued									
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.5	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	97.9	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	97.2	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.1	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	95.4	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.1	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	97.2	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	95.7	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	96.8	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	97.9	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	97.5	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	96.4	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	93.9	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	91.6	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	96.3	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	98.2	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	95.8	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	102	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.5	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	89.9	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.1	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.0	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	93.8	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	94.0	80.0	120	----

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: 1621124)										
FJ2402589-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1621125)										
FJ2402589-002	Anonymous	Chloride	16887-00-6	E235.Cl	500 mg/L	500 mg/L	100.0	75.0	125	----
Anions and Nutrients (QCLot: 1621126)										
FJ2402589-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	12.4 mg/L	12.5 mg/L	99.5	75.0	125	----
Anions and Nutrients (QCLot: 1621127)										
FJ2402589-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	2.51 mg/L	2.5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 1621128)										
FJ2402589-002	Anonymous	Fluoride	16984-48-8	E235.F	5.00 mg/L	5 mg/L	100.0	75.0	125	----
Anions and Nutrients (QCLot: 1628903)										
FJ2402580-001	EERI-3	Ammonia, total (as N)	7664-41-7	E298	0.0958 mg/L	0.1 mg/L	95.8	75.0	125	----
Anions and Nutrients (QCLot: 1818198)										
FJ2402417-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0319 mg/L	0.03 mg/L	106	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1628803)										
FJ2402580-001	EERI-3	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1622083)										
FJ2402565-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.184 mg/L	0.2 mg/L	92.0	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0377 mg/L	0.04 mg/L	94.3	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00998 mg/L	0.01 mg/L	99.8	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.090 mg/L	0.1 mg/L	89.7	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00386 mg/L	0.004 mg/L	96.4	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00981 mg/L	0.01 mg/L	98.1	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0387 mg/L	0.04 mg/L	96.8	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.84 mg/L	2 mg/L	92.1	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0901 mg/L	0.1 mg/L	90.1	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND 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
Dissolved Metals (QCLot: 1622083) - continued										
FJ2402565-002	Anonymous	Molybdenum, dissolved	7439-98-7	E421	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0361 mg/L	0.04 mg/L	90.4	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	9.32 mg/L	10 mg/L	93.2	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.52 mg/L	4 mg/L	88.1	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0189 mg/L	0.02 mg/L	94.6	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.10 mg/L	10 mg/L	91.0	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00389 mg/L	0.004 mg/L	97.3	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	20.4 mg/L	20 mg/L	102	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0407 mg/L	0.04 mg/L	102	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00399 mg/L	0.004 mg/L	99.8	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0365 mg/L	0.04 mg/L	91.3	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00408 mg/L	0.004 mg/L	102	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0956 mg/L	0.1 mg/L	95.6	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.365 mg/L	0.4 mg/L	91.3	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0372 mg/L	0.04 mg/L	92.9	70.0	130	----
Dissolved Metals (QCLot: 1633044)										
FJ2402564-002	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000940 mg/L	0 mg/L	94.0	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page of

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Fort St. John
Work Order Reference
FJ2402580

Telephone : +1 250 261 5517

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax amanda@westernwater.ca
Email 2 warren@westernwater.ca

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges app
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharg
☐ 3 day [P3] if received by 3pm M-F - 25% rush surchar
☐ 2 day [P2] if received by 3pm M-F - 50% rush surchar
☐ 1 day [E] if received by 3pm M-F - 100% rush surchar
☐ Same day [E2] if received by 10am M-S - 200% rush s
Additional fees may apply to rush requests on w
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested,

Project Information		Oil and Gas Required Fields (client use)	
ALS Client Code / QUOTE #:	VA24-WESW100-001	AFE/Cost Center:	PO#
Job / Project #:	24-065-01PG	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact: Ian Chen	Sampler: AB

Analysis Request

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

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	major and minor cations	~~total metals+Hg~~	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4)	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	Isotopes	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	EFR1-3	26-AUG-24	17:30	GW	9	X		X	X	X	X	X	X	X	X	X			

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

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

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

dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane), and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
10.8							

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	August 27/23	7:30		Aug 27/24	7:45			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25021**
Client Project ID:	**FJ2402580**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0130	FJ2402580-001	EERI-3	26-Aug-24	29-Aug-24	Dissolved Gas	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	2.90		<0.01	0.14	20.89	76.06	100.0

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25021**
Client Project ID:	**FJ2402580**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes												
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0130	FJ2402580-001	EERI-3	0.012				87.84	653.14								-16.7							

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25021**
Client Project ID:	**FJ2402580**

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0130	FJ2402580-001	EERI-3		Headspace present; EPA method RSKSOP-175 not used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25021**
Client File No:	**FJ2402580**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0130	FJ2402580-001	EERI-3	26-Aug-24	29-Aug-24	-22.6	0.05	-175	0.21	-9.0	

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

CERTIFICATE OF ANALYSIS

Work Order	: **FJ2402547**			
Amendment	: **1**			
Client	: **Western Water Associates Ltd**	Laboratory	:	ALS Environmental - Vancouver
Contact	: Stefanie Schoenberger	Account Manager	:	Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	:	8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	:	+1 604 253 4188
Project	: 24-065-01PG	Date Samples Received	:	23-Aug-2024 07:30
PO	: ----	Date Analysis Commenced	:	26-Aug-2024
C-O-C number	: ----	Issue Date	:	20-Dec-2024 17:19
Sampler	: A B			
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program			
Quote number	: VA24-WESW100-001			
No. of samples received	: 1			
No. of samples analysed	: 1			

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Kate Dimitrova	Supervisor - Inorganic	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Metals, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	no units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.

Workorder Comments

Amendment (20/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data. Orthophosphate was added to FJ2402547-1.

Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: EER1-4	----	----	----	----
					Client sampling date / time: 22-Aug-2024 13:30	----	----	----	----
					FJ2402547-001	----	----	----	----
					Result	----	----	----	----
Physical Tests									
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L	2120	----	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L	138	----	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L	<1.0	----	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	2260	----	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm	3660	----	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L	106	----	----	----	----
pH	----	E108/VA	0.10	pH units	8.61	----	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L	2540	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	1.32	----	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L	29.1	----	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L	0.595	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L	<0.100 DLDS	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L	<0.102	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L	<0.0200 DLDS	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	<0.0010	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L	81.3	----	----	----	----
Organic / Inorganic Carbon									
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L	590	----	----	----	----
Ion Balance									
Anion sum	----	EC101/VA	0.10	meq/L	47.7	----	----	----	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

					Client sample ID	EER1-4	----	----	----	----
					Client sampling date / time	22-Aug-2024 13:30	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402547-001	----	----	----	----
						Result	----	----	----	----
Ion Balance										
Cation sum	----	EC101/VA	0.10	meq/L		46.7	----	----	----	----
Ion balance (cations/anions)	----	EC101/VA	0.010	%		97.9	----	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%		-1.06	----	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.0083	----	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00050 DLA	----	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00296	----	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		3.20	----	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000100 DLA	----	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000250 DLA	----	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.473	----	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000250 DLA	----	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		23.0	----	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		0.000054	----	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00250 DLA	----	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00109	----	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		<0.00100 DLA	----	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		1.04	----	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000250 DLA	----	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		1.72	----	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		11.9	----	----	----	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

					Client sample ID	EER1-4	----	----	----	----
					Client sampling date / time	22-Aug-2024 13:30	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402547-001	----	----	----	----
						Result	----	----	----	----
Dissolved Metals										
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.185	----	----	----	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	----	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.00605	----	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		0.00901	----	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.250 DLA	----	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		3.43	----	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00296	----	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		<0.000250 DLA	----	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		5.91	----	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000050 DLA	----	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		1020	----	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.932	----	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		31.4	----	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00100 DLA	----	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000050 DLA	----	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00050 DLA	----	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00050 DLA	----	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00150 DLA	----	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		0.00739	----	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.00436	----	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00250 DLA	----	----	----	----

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	EER1-4	----	----	----	----
					Client sampling date / time	22-Aug-2024 13:30	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402547-001	----	----	----	----
						Result	----	----	----	----
Dissolved Metals										
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		<0.0050 DLA	----	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L		0.0102	----	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	----	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	----	----	----	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	----	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----

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

ALS Canada Ltd.

right solutions. right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402547**	Page	: 1 of 9
Amendment	: **1**		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Stefanie Schoenberger	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: ----	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 23-Aug-2024 07:30
PO	: ----	Issue Date	: 20-Dec-2024 17:18
C-O-C number	: ----		
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 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) EER1-4	E298	22-Aug-2024	30-Aug-2024	28 days	8 days	✓	31-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EER1-4	E235.Cl	22-Aug-2024	26-Aug-2024	28 days	4 days	✓	26-Aug-2024	28 days	4 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EER1-4	E378-U	22-Aug-2024	20-Dec-2024	51 hrs	2877 hrs	× EHT	20-Dec-2024	51 hrs	2879 hrs	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE EER1-4	E235.F	22-Aug-2024	26-Aug-2024	28 days	4 days	✓	26-Aug-2024	28 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EER1-4	E235.NO3-L	22-Aug-2024	26-Aug-2024	3 days	4 days	× EHT	26-Aug-2024	3 days	4 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EER1-4	E235.NO2-L	22-Aug-2024	26-Aug-2024	3 days	4 days	× EHT	26-Aug-2024	3 days	4 days	× EHT
Anions and Nutrients : Sulfate in Water by IC										
HDPE EER1-4	E235.SO4	22-Aug-2024	26-Aug-2024	28 days	4 days	✓	26-Aug-2024	28 days	4 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* 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 (lab preserved) EER1-4	E509	22-Aug-2024	01-Sep-2024	28 days	10 days	✓	01-Sep-2024	28 days	10 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EER1-4	E421	22-Aug-2024	29-Aug-2024	180 days	7 days	✓	01-Sep-2024	180 days	10 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EER1-4	E353-L	22-Aug-2024	----	----	----		29-Aug-2024	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EER1-4	E290	22-Aug-2024	26-Aug-2024	14 days	4 days	✓	27-Aug-2024	14 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE EER1-4	E100	22-Aug-2024	26-Aug-2024	28 days	4 days	✓	27-Aug-2024	28 days	5 days	✓
Physical Tests : pH by Meter										
HDPE EER1-4	E108	22-Aug-2024	26-Aug-2024	0.25 hrs	102 hrs	✖ EHTR-FM	27-Aug-2024	0.25 hrs	122 hrs	✖ EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container EER1-4	C-13 DIC	22-Aug-2024	----	----	----		16-Dec-2024	----	116 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container EER1-4	H-2+O-18	22-Aug-2024	----	----	----		16-Dec-2024	----	116 days	

Legend & Qualifier Definitions

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	1617208	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1625130	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1617210	1	20	5.0	5.0	✓
Conductivity in Water	E100	1617207	1	14	7.1	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1624393	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1628648	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1619520	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1617213	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1617211	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1617212	1	15	6.6	5.0	✓
pH by Meter	E108	1617206	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1617209	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1617208	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1625130	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1617210	1	20	5.0	5.0	✓
Conductivity in Water	E100	1617207	1	14	7.1	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1624393	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1628648	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1619520	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1617213	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1617211	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1617212	1	15	6.6	5.0	✓
pH by Meter	E108	1617206	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1617209	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1617208	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1625130	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1617210	1	20	5.0	5.0	✓
Conductivity in Water	E100	1617207	1	14	7.1	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1624393	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1628648	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1619520	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*
Method Blanks (MB) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1617213	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1617211	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1617212	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1617209	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1625130	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1617210	1	20	5.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1624393	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1628648	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1619520	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1617213	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1617211	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1617212	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1617209	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18	Water		See attached report.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1			

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **FJ2402547**	Page	: 1 of 12
Amendment	: **1**		
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Stefanie Schoenberger	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: ----	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 23-Aug-2024 07:30
PO	: ----	Date Analysis Commenced	: 26-Aug-2024
C-O-C number	: ----	Issue Date	: 20-Dec-2024 17:18
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Kate Dimitrova	Supervisor - Inorganic	Vancouver Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Inorganics, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1617206)											
FJ2402547-001	EER1-4	pH	----	E108	0.10	pH units	8.61	8.62	0.116%	4%	----
Physical Tests (QC Lot: 1617207)											
FJ2402547-001	EER1-4	Conductivity	----	E100	2.0	µS/cm	3660	3650	0.274%	10%	----
Physical Tests (QC Lot: 1617208)											
FJ2402547-001	EER1-4	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	2120	2100	1.12%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	138	134	2.35%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	2260	2230	1.19%	20%	----
Anions and Nutrients (QC Lot: 1617209)											
KS2403414-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	940	930	1.10%	20%	----
Anions and Nutrients (QC Lot: 1617210)											
KS2403414-001	Anonymous	Chloride	16887-00-6	E235.Cl	10.0	mg/L	507	500	1.28%	20%	----
Anions and Nutrients (QC Lot: 1617211)											
KS2403414-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	0.999	0.976	0.0223	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1617212)											
KS2403414-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	<0.0200	<0.0200	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1617213)											
KS2403414-001	Anonymous	Fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1625130)											
FJ2402547-001	EER1-4	Ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	1.32	1.30	1.84%	20%	----
Anions and Nutrients (QC Lot: 1818198)											
FJ2402387-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1624393)											
FJ2402547-001	EER1-4	Carbon, dissolved inorganic [DIC]	----	E353-L	5.00	mg/L	590	578	2.02%	20%	----
Dissolved Metals (QC Lot: 1619520)											
VA24C1807-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0039	0.0042	0.0002	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00010	0.00011	0.000005	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00095	0.00082	0.00013	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0490	0.0447	9.04%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1619520) - continued											
VA24C1807-001	Anonymous	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	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.000251	0.000268	6.62%	20%	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	128	139	8.08%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.00436	0.00478	9.04%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00054	0.00052	0.00002	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00168	0.00157	0.00011	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.053	0.054	0.0007	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	0.0120	0.0125	3.68%	20%	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	54.4	51.1	6.11%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.993	0.971	2.23%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000575	0.000598	3.92%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00129	0.00120	0.00009	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	5.57	5.26	5.72%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0104	0.0102	2.36%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.100	mg/L	3.28	3.24	1.25%	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	11.8	11.1	5.98%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.622	0.676	8.43%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	153	147	3.59%	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	0.000018	0.000021	0.000003	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	0.00050	0.00020	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	0.0419	0.0458	8.92%	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	0.0469	0.0446	5.00%	20%	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1628648)											
FJ2402547-001	EER1-4	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1617207)						
Conductivity	----	E100	1	µS/cm	1.2	----
Physical Tests (QCLot: 1617208)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1617209)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1617210)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1617211)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1617212)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1617213)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1625130)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1818198)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 1624393)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1619520)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1619520) - continued						
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1628648)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1617206)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1617207)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	98.9	90.0	110	----
Physical Tests (QCLot: 1617208)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 1617209)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1617210)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1617211)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1617212)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1617213)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1625130)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	94.0	85.0	115	----
Anions and Nutrients (QCLot: 1818198)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1624393)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 1619520)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	99.7	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	99.8	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	99.6	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	100.0	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	106	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	96.3	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1619520) - continued									
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.3	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	99.2	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.6	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.3	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	89.1	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	99.8	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	101	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	110	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	100	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.4	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	91.4	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	94.0	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	97.9	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.0	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	101	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.9	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	102	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	88.5	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	99.4	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	96.3	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	100	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	97.6	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.7	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.7	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	92.8	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	94.2	80.0	120	----

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: 1617209)										
KS2403414-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1010 mg/L	1000 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1617210)										
KS2403414-002	Anonymous	Chloride	16887-00-6	E235.Cl	1010 mg/L	1000 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1617211)										
KS2403414-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1617212)										
KS2403414-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	5.00 mg/L	5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 1617213)										
KS2403414-002	Anonymous	Fluoride	16984-48-8	E235.F	10.2 mg/L	10 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1625130)										
FJ2402561-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1818198)										
FJ2402417-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0319 mg/L	0.03 mg/L	106	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1624393)										
FJ2402561-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1619520)										
FJ2402550-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.188 mg/L	0.2 mg/L	93.9	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.089 mg/L	0.1 mg/L	89.4	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00400 mg/L	0.004 mg/L	100.0	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0106 mg/L	0.01 mg/L	106	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0396 mg/L	0.04 mg/L	99.0	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0189 mg/L	0.02 mg/L	94.6	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.95 mg/L	2 mg/L	97.4	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0967 mg/L	0.1 mg/L	96.7	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0184 mg/L	0.02 mg/L	92.3	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
Dissolved Metals (QCLot: 1619520) - continued										
FJ2402550-001	Anonymous	Molybdenum, dissolved	7439-98-7	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0384 mg/L	0.04 mg/L	96.0	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	10.2 mg/L	10 mg/L	102	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	ND mg/L	----	ND	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0184 mg/L	0.02 mg/L	91.9	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0399 mg/L	0.04 mg/L	99.8	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	10.7 mg/L	10 mg/L	107	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00400 mg/L	0.004 mg/L	99.9	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	21.0 mg/L	20 mg/L	105	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0430 mg/L	0.04 mg/L	107	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00399 mg/L	0.004 mg/L	99.7	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0191 mg/L	0.02 mg/L	95.3	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0380 mg/L	0.04 mg/L	95.1	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00415 mg/L	0.004 mg/L	104	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0986 mg/L	0.1 mg/L	98.6	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.407 mg/L	0.4 mg/L	102	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0428 mg/L	0.04 mg/L	107	70.0	130	----
Dissolved Metals (QCLot: 1628648)										
FJ2402550-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000997 mg/L	0 mg/L	99.7	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page of

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Fort St. John
Work Order Reference
FJ2402547

Telephone : +1 250 261 5517

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Project Information	
ALS Client Code / QUOTE #:	VA24-WESW100-001
Job / Project #:	24-065-01PG
PO / AFE:	
LSD:	
ALS Lab Work Order # (ALS use only):	

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

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	amanda@westernwater.ca
Email 2	warren@westernwater.ca

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

ALS Contact: Ian Chen Sampler: AB

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges ap
☐ 4 day [P4] if received by 3pm M-F - 20% rush surchar
☐ 3 day [P3] if received by 3pm M-F - 25% rush surchar
☐ 2 day [P2] if received by 3pm M-F - 50% rush surchan
☐ 1 day [E] if received by 3pm M-F - 100% rush surchar
☐ Same day [E2] if received by 10am M-S - 200% rush s
Additional fees may apply to rush requests on w
Date and Time Required for all E&P TATs:

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

Analysis Request

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

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	major and minor cations	total metals	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	Isotopes	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	FER1-4	22-Aug-24	13:30	GW	9	X		X	X	X	X	X	X	X	X	X			
	FER1-5 — VOID SAMPLE, JUST RETURNING BOTTLES																		

FJAE Shipping & Receiving
Call Out
Expedite
Priority
1 # of Coolers
✓ Air
# of Carboys
Ground

Drinking Water (DW) Samples[1] (client use)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO
Are samples for human consumption/ use? ☐ YES ☐ NO

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

VOID FER1-5 Sample

dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane) and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
10.6				10			

SHIPMENT RELEASE (client use)		
Released by:	Date:	Time:
[signature]	Aug 23/24	7:30

INITIAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:
[signature]	Aug 23/24	7:30

FINAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:
[signature]	Aug 23	9:45 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25017**
Client Project ID:	**FJ2402547**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0124	FJ2402547-001	EER1-4	22-Aug-24	28-Aug-24	Dissolved Gas	7.58	0.002	0.002	0.001	0.002	<0.001	0.001	<0.001	<0.001	<0.001	2.64				0.60	17.92	

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25017**
Client Project ID:	**FJ2402547**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes												
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0124	FJ2402547-001	EER1-4	8.693	0.005	0.007	0.005	51.74	31.72	-59.1							-16.2	-414						

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25017**
Client Project ID:	**FJ2402547**

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0124	FJ2402547-001	EER1-4		EPA method RSKSOP-175 used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25017**
Client File No:	**FJ2402547**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0124	FJ2402547-001	EER1-4	22-Aug-24	28-Aug-24	-24.1	0.01	-188	0.04	-7.7	

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

CERTIFICATE OF ANALYSIS

Work Order	:	**FJ2402387**		
Client	:	**Western Water Associates Ltd**	Laboratory	: ALS Environmental - Vancouver
Contact	:	Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	:	#201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	:	250 541 1030	Telephone	: +1 604 253 4188
Project	:	24-065-01PG	Date Samples Received	: 14-Aug-2024 07:50
PO	:	----	Date Analysis Commenced	: 22-Aug-2024
C-O-C number	:	----	Issue Date	: 16-Dec-2024 17:57
Sampler	:	A B		
Site	:	BC Energy Regulator RFI54525001 - Groundwater Sampling Program		
Quote number	:	VA24-WESW100-001		
No. of samples received	:	2		
No. of samples analysed	:	2		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Daniel Shabestani	Lab Assistant	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Metals, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	no units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-6	EERI-19	----	----	----
					Client sampling date / time	13-Aug-2024 14:00	13-Aug-2024 17:30	----	----	----
						FJ2402387-001	FJ2402387-002	----	----	----
						Result	Result	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		742	730	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	27.0	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		742	757	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm		1160	1690	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		251	180	----	----	----
pH	----	E108/VA	0.10	pH units		8.18	8.41	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		747	1100	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		1.40	1.10	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		<2.50 DLDS	<5.00 DLDS	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		0.962	0.384	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.0250 DLDS	<0.0500 DLDS	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.0255	<0.0510	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0050 DLDS	<0.0100 DLDS	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		<1.50 DLDS	201	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		186	202	----	----	----
Ion Balance										
Anion sum	----	EC101/VA	0.10	meq/L		14.9	19.3	----	----	----
Cation sum	----	EC101/VA	0.10	meq/L		14.1	19.7	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-6	EERI-19	----	----	----
					Client sampling date / time	13-Aug-2024 14:00	13-Aug-2024 17:30	----	----	----
						FJ2402387-001	FJ2402387-002	----	----	----
						Result	Result	----	----	----
Ion Balance										
Ion balance (cations/anions)	----	EC101/VA	0.010	%		94.6	102	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%		-2.76	1.02	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		<0.0010	0.0168	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00010	<0.00020 DLA	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00050	0.00096	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		4.52	0.0178	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000020	<0.000040 DLA	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	<0.000100 DLA	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.217	0.443	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000050	<0.0000100 DLA	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		46.6	37.8	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		0.000045	0.000037	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	<0.00100 DLA	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		<0.00010	<0.00020 DLA	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		<0.00020	<0.00040 DLA	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		1.85	0.399	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	<0.000100 DLA	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.256	0.0596	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		32.6	20.9	----	----	----
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.200	0.0911	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-6	EERI-19	----	----	----
					Client sampling date / time	13-Aug-2024 14:00	13-Aug-2024 17:30	----	----	----
						FJ2402387-001	FJ2402387-002	----	----	----
						Result	Result	----	----	----
Dissolved Metals										
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.000565	0.00110	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		<0.00050	<0.00100 DLA	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.050	<0.100 DLA	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		2.73	3.00	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00288	0.00217	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		<0.000050	<0.000100 DLA	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		4.36	4.46	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000020 DLA	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		203	367	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		1.68	0.436	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		<0.50	72.8	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00020	<0.00040 DLA	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	<0.000020 DLA	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00010	<0.00020 DLA	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	<0.00020 DLA	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00030	<0.00060 DLA	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		0.00023	<0.00020 DLA	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		<0.000010	0.00100	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00050	<0.00100 DLA	----	----	----
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0020	0.0195	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-6	EERI-19	----	----	----
					Client sampling date / time	13-Aug-2024 14:00	13-Aug-2024 17:30	----	----	----
						FJ2402387-001	FJ2402387-002	----	----	----
						Result	Result	----	----	----
Dissolved Metals										
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L		<0.00030	<0.00040 DLA	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	Field	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	----	----	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	see attached	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	----	----	----

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

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402387**	Page	: 1 of 11
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 14-Aug-2024 07:50
PO	: ----	Issue Date	: 16-Dec-2024 17:56
C-O-C number	: ----		
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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 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) EERI-19	E298	13-Aug-2024	23-Aug-2024	28 days	9 days	✓	24-Aug-2024	28 days	11 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EERI-6	E298	13-Aug-2024	23-Aug-2024	28 days	9 days	✓	24-Aug-2024	28 days	11 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-19	E235.Cl	13-Aug-2024	22-Aug-2024	28 days	9 days	✓	23-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-6	E235.Cl	13-Aug-2024	22-Aug-2024	28 days	9 days	✓	23-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-19	E235.F	13-Aug-2024	22-Aug-2024	28 days	9 days	✓	23-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-6	E235.F	13-Aug-2024	22-Aug-2024	28 days	9 days	✓	23-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-19	E235.NO3-L	13-Aug-2024	22-Aug-2024	3 days	9 days	× EHT	23-Aug-2024	3 days	9 days	× EHT

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 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 EERI-6	E235.NO3-L	13-Aug-2024	22-Aug-2024	3 days	9 days	× EHT	23-Aug-2024	3 days	9 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-19	E235.NO2-L	13-Aug-2024	22-Aug-2024	3 days	9 days	× EHT	23-Aug-2024	3 days	9 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-6	E235.NO2-L	13-Aug-2024	22-Aug-2024	3 days	9 days	× EHT	23-Aug-2024	3 days	9 days	× EHT
Anions and Nutrients : Sulfate in Water by IC										
HDPE EERI-19	E235.SO4	13-Aug-2024	22-Aug-2024	28 days	9 days	✓	23-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EERI-6	E235.SO4	13-Aug-2024	22-Aug-2024	28 days	9 days	✓	23-Aug-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) EERI-19	E509	13-Aug-2024	23-Aug-2024	28 days	10 days	✓	23-Aug-2024	28 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) EERI-6	E509	13-Aug-2024	23-Aug-2024	28 days	10 days	✓	23-Aug-2024	28 days	10 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
Glass vial - dissolved (lab preserved) EERI-19	E421	13-Aug-2024	25-Aug-2024	180 days	12 days	✓	27-Aug-2024	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
Glass vial - dissolved (lab preserved) EERI-6	E421	13-Aug-2024	25-Aug-2024	180 days	12 days	✓	27-Aug-2024	180 days	14 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*	
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-19	E353-L	13-Aug-2024	----	----	----		26-Aug-2024	14 days	13 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-6	E353-L	13-Aug-2024	----	----	----		26-Aug-2024	14 days	13 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-19	E290	13-Aug-2024	22-Aug-2024	14 days	9 days	✓	23-Aug-2024	14 days	10 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-6	E290	13-Aug-2024	22-Aug-2024	14 days	9 days	✓	23-Aug-2024	14 days	10 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-19	E100	13-Aug-2024	22-Aug-2024	28 days	9 days	✓	23-Aug-2024	28 days	10 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-6	E100	13-Aug-2024	22-Aug-2024	28 days	9 days	✓	23-Aug-2024	28 days	10 days	✓
Physical Tests : pH by Meter										
HDPE EERI-19	E108	13-Aug-2024	22-Aug-2024	0.25 hrs	221 hrs	× EHTR-FM	23-Aug-2024	0.25 hrs	235 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EERI-6	E108	13-Aug-2024	22-Aug-2024	0.25 hrs	224 hrs	× EHTR-FM	23-Aug-2024	0.25 hrs	238 hrs	× EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container EERI-19	C-13 DIC	13-Aug-2024	----	----	----		16-Dec-2024	----	125 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*	
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container										
EERI-6	C-13 DIC	13-Aug-2024	----	----	----		16-Dec-2024	----	125 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container										
EERI-19	H-2+O-18	13-Aug-2024	----	----	----		16-Dec-2024	----	125 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container										
EERI-6	H-2+O-18	13-Aug-2024	----	----	----		16-Dec-2024	----	125 days	

Legend & Qualifier Definitions

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	1611752	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1611867	1	10	10.0	5.0	✓
Chloride in Water by IC	E235.Cl	1611745	1	20	5.0	5.0	✓
Conductivity in Water	E100	1611751	1	18	5.5	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1616304	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1614030	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1612425	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1611748	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1611746	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1611747	1	20	5.0	5.0	✓
pH by Meter	E108	1611750	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1611744	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1611752	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1611867	1	10	10.0	5.0	✓
Chloride in Water by IC	E235.Cl	1611745	1	20	5.0	5.0	✓
Conductivity in Water	E100	1611751	1	18	5.5	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1616304	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1614030	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1612425	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1611748	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1611746	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1611747	1	20	5.0	5.0	✓
pH by Meter	E108	1611750	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1611744	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1611752	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1611867	1	10	10.0	5.0	✓
Chloride in Water by IC	E235.Cl	1611745	1	20	5.0	5.0	✓
Conductivity in Water	E100	1611751	1	18	5.5	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1616304	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1614030	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1612425	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1611748	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1611746	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*
Method Blanks (MB) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	1611747	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1611744	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1611867	1	10	10.0	5.0	✓
Chloride in Water by IC	E235.Cl	1611745	1	20	5.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1616304	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1614030	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1612425	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1611748	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1611746	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1611747	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1611744	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18 Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water		See attached report.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **FJ2402387**	Page	: 1 of 10
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 14-Aug-2024 07:50
PO	: ----	Date Analysis Commenced	: 22-Aug-2024
C-O-C number	: ----	Issue Date	: 16-Dec-2024 17:57
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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*
Daniel Shabestani	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1611750)											
VA24C1036-001	Anonymous	pH	----	E108	0.10	pH units	8.30	8.31	0.120%	4%	----
Physical Tests (QC Lot: 1611751)											
VA24C1036-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	321	319	0.625%	10%	----
Physical Tests (QC Lot: 1611752)											
VA24C1036-001	Anonymous	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	149	144	3.96%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	2.0	3.2	46.2%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	151	147	3.09%	20%	----
Anions and Nutrients (QC Lot: 1611744)											
VA24C1036-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	19.7	19.7	0.138%	20%	----
Anions and Nutrients (QC Lot: 1611745)											
VA24C1036-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	0.89	1.88	0.99	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1611746)											
VA24C1036-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1611747)											
VA24C1036-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1611748)											
VA24C1036-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	1.81	1.81	0.349%	20%	----
Anions and Nutrients (QC Lot: 1611867)											
FJ2402387-001	EERI-6	Ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	1.40	1.38	1.26%	20%	----
Organic / Inorganic Carbon (QC Lot: 1616304)											
FJ2402387-001	EERI-6	Carbon, dissolved inorganic [DIC]	----	E353-L	5.00	mg/L	186	184	1.15%	20%	----
Dissolved Metals (QC Lot: 1612425)											
YL2401217-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0190	0.0182	4.57%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00022	0.00022	0.000001	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00199	0.00198	0.0210%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0378	0.0380	0.497%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.017	0.018	0.0003	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: 1612425) - continued											
YL2401217-001	Anonymous	Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000057	0.0000055	0.0000002	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	23.3	23.6	1.28%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00164	0.00161	0.00002	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.044	0.045	0.001	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	0.0045	0.0045	0.00006	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	7.19	7.22	0.400%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00214	0.00224	4.43%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000666	0.000660	0.846%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00123	0.00119	0.00004	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.776	0.770	0.791%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00087	0.00077	0.00010	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000176	0.000180	0.000004	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	0.834	0.861	3.26%	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	7.64	8.01	4.61%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.128	0.129	1.15%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.70	10.0	3.06%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000373	0.000391	4.64%	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	<0.0010	<0.0010	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1614030)											
FJ2402387-001	EERI-6	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1611751)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 1611752)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1611744)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1611745)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1611746)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1611747)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1611748)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1611867)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 1616304)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1612425)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1612425) - continued						
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1614030)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1611750)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1611751)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	104	90.0	110	----
Physical Tests (QCLot: 1611752)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 1611744)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 1611745)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1611746)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1611747)									
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: 1611748)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1611867)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	94.5	85.0	115	----
Organic / Inorganic Carbon (QCLot: 1616304)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 1612425)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	99.8	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	98.1	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.0	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	95.0	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	89.6	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	95.7	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1612425) - continued									
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	95.6	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.6	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.3	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	97.3	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.4	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	89.1	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	96.8	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.2	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	98.1	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	111	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	98.5	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	103	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	110	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	91.0	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.9	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	112	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	92.8	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.2	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	96.4	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.0	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	97.7	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	97.2	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	91.6	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	95.9	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	93.8	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	96.1	80.0	120	----

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: 1611744)										
VA24C1036-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 1611745)										
VA24C1036-002	Anonymous	Chloride	16887-00-6	E235.Cl	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 1611746)										
VA24C1036-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1611747)										
VA24C1036-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.512 mg/L	0.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1611748)										
VA24C1036-002	Anonymous	Fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1611867)										
FJ2402387-002	EERI-19	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1616304)										
FJ2402387-002	EERI-19	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1612425)										
YL2401217-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.192 mg/L	0.2 mg/L	96.0	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0194 mg/L	0.02 mg/L	97.3	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0384 mg/L	0.04 mg/L	95.9	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00905 mg/L	0.01 mg/L	90.5	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.090 mg/L	0.1 mg/L	89.6	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00396 mg/L	0.004 mg/L	98.9	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.92 mg/L	2 mg/L	95.9	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0878 mg/L	0.1 mg/L	87.8	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0193 mg/L	0.02 mg/L	96.6	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	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	9.67 mg/L	10 mg/L	96.7	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: 1612425) - continued										
YL2401217-002	Anonymous	Potassium, dissolved	7440-09-7	E421	3.78 mg/L	4 mg/L	94.6	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0392 mg/L	0.04 mg/L	98.0	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.48 mg/L	10 mg/L	94.8	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00399 mg/L	0.004 mg/L	99.8	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	18.8 mg/L	20 mg/L	94.0	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0418 mg/L	0.04 mg/L	104	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	0.0189 mg/L	0.02 mg/L	94.5	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0382 mg/L	0.04 mg/L	95.6	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00366 mg/L	0.004 mg/L	91.5	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0984 mg/L	0.1 mg/L	98.4	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.387 mg/L	0.4 mg/L	96.8	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----
Dissolved Metals (QCLot: 1614030)										
FJ2402387-002	EERI-19	Mercury, dissolved	7439-97-6	E509	0.0000944 mg/L	0 mg/L	94.4	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

COC Number: 22 -

Page 1 of 1

Environmental Division
Fort St. John
Work Order Reference
FJ2402387

Telephone : +1 250 261 5517

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: amanda@westernwater.ca
Email 2: warren@westernwater.ca

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minim
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minim
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minim
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minim
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Additional fees may apply to rush requests on weekends.
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please cont... availability.

Project Information

ALS Client Code / QUOTE #:	VA24-WESW100-001
Job / Project #:	24-065-01PG
PO / AFE:	
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):

ALS Contact: Ian Chen Sampler: AB

Analysis Request

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

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	major and minor cations	total metals	dissolved metals+Hg (F)	anions(F, Cl, NO3, HCO3, PO4, SO4) (F)	ammonia	alkalinity	hardness	dissolved inorganic carbon (F)	total dissolved solids	dissolved gases	Isotopes	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	EFRI-6	13-AUG-24	14:00	GW	11	X		X	X	X	X	X	X	X	X	X			
	EFRI-19	13-AUG-24	17:30	GW	10	X		X	X	X	X	X	X	X	X	X			

FJAE Shipping & Receiving
Call Out
Expedite
Priority
1 # of Coolers
Air
# of Carboys
Ground

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

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

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

dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane), and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
0.5				1.0			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
	AUG 14/24	7:45

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
JB	AUG 14/24	7:50

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
RJ	AUG 15	10:15

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Fort St. John
Work Order Reference
FJ2402387

Telephone : +1 250 261 5517

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

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

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	amanda@westernwater.ca
Email 2	warren@westernwater.ca

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimu
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minim
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minim
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minim
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Additional fees may apply to rush requests on weekends.
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please confirm.

Project Information	
ALS Client Code / QUOTE #:	VA24-WESW100-001
Job / Project #:	24-065-01PG
PO / AFE:	
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):

ALS Contact: Ian Chen

Sampler: AB

Analysis Request

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

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	major and minor cations	total metals	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	Isotopes	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	EFRI-6	13-AUG-24	14:00	GW	11	X		X	X	X	X	X	X	X	X	X			
	EFRI-19	13-AUG-24	17:30	GW	10	X		X	X	X	X	X	X	X	X	X			

FJAE Shipping & Receiving
Call Out
Expedite
Priority
1 # of Coolers
Air
# of Carboys
Ground

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane), and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
0.5				1.0			

SHIPMENT RELEASE (client use)		
Released by:	Date:	Time:
	Aug 14/24	7:45

INITIAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:
JB	Aug 14/24	7:50

FINAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:
	Aug 15	10:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25005**
Client Project ID:	**FJ2402387**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0053	FJ2402387-001	EERI-6	13-Aug-24	21-Aug-24	Dissolved Gas	3.19	0.005	0.006	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	1.15				1.01	16.83	
IB-25-0054	FJ2402387-002	EERI-19	13-Aug-24	21-Aug-24	Dissolved Gas	0.006	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	1.57				6.00	41.95	

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25005**
Client Project ID:	**FJ2402387**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes												
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0053	FJ2402387-001	EERI-6	3.157	0.010	0.017	0.003	21.72	25.25	-69.1							-23.7	-274						
IB-25-0054	FJ2402387-002	EERI-19	0.007				30.23	71.80								-18.1							

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25005**
Client Project ID:	**FJ2402387**

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0053	FJ2402387-001	EERI-6		EPA method RSKSOP-175 used.
IB-25-0054	FJ2402387-002	EERI-19		EPA method RSKSOP-175 used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25005**
Client File No:	**FJ2402387**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0053	FJ2402387-001	EERI-6	13-Aug-24	21-Aug-24	-22.6	0.09	-176	0.36	-15.8	
IB-25-0054	FJ2402387-002	EERI-19	13-Aug-24	21-Aug-24	-21.8	0.02	-173	0.17	-9.8	

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

CERTIFICATE OF ANALYSIS

Work Order	: **FJ2402570**			
Amendment	: **1**			
Client	: **Western Water Associates Ltd**	Laboratory	:	ALS Environmental - Vancouver
Contact	: Warren Grafton	Account Manager	:	Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	:	8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 541 1030	Telephone	:	+1 604 253 4188
Project	: 24-065-01PG	Date Samples Received	:	26-Aug-2024 08:00
PO	: ----	Date Analysis Commenced	:	27-Aug-2024
C-O-C number	: ----	Issue Date	:	20-Dec-2024 17:21
Sampler	: A B			
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program			
Quote number	: VA24-WESW100-001			
No. of samples received	: 1			
No. of samples analysed	: 1			

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Maya Urquhart	Lab Analyst	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	no units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.

Workorder Comments

Amendment (20/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data. Orthophosphate was added to FJ2402570-1.

Qualifiers

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-12	----	----	----	----
					Client sampling date / time	24-Aug-2024 13:50	----	----	----	----
						FJ2402570-001	----	----	----	----
						Result	----	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		488	----	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	----	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	----	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		488	----	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm		1220	----	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		129	----	----	----	----
pH	----	E108/VA	0.10	pH units		7.88	----	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		764	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		0.589	----	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		<2.50 DLDS	----	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		0.148	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.0250 DLDS	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.0255	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0050 DLDS	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		<0.0010	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		173	----	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		121	----	----	----	----
Ion Balance										
Anion sum	----	EC101/VA	0.10	meq/L		13.4	----	----	----	----

alsglobal.com

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-12	----	----	----	----
					Client sampling date / time	24-Aug-2024 13:50	----	----	----	----
						FJ2402570-001	----	----	----	----
						Result	----	----	----	----
Ion Balance										
Cation sum	----	EC101/VA	0.10	meq/L		13.2	----	----	----	----
Ion balance (cations/anions)	----	EC101/VA	0.010	%		98.5	----	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%		-0.75	----	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.0013	----	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		0.00011	----	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00102	----	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.0139	----	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000020	----	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	----	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.199	----	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		0.0000094	----	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		20.2	----	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		0.000027	----	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	----	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00059	----	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		0.00028	----	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		<0.010	----	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	----	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0131	----	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		19.0	----	----	----	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	EERI-12	----	----	----	----
Client sampling date / time					24-Aug-2024 13:50	----	----	----	----
					FJ2402570-001	----	----	----	----
					Result	----	----	----	----
Dissolved Metals									
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L	0.136	----	----	----	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L	<0.0000050	----	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L	0.00207	----	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L	0.00208	----	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L	<0.050	----	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L	2.41	----	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L	0.00129	----	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L	<0.000050	----	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L	4.60	----	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L	<0.000010	----	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L	243	----	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L	0.500	----	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L	62.9	----	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L	<0.00020	----	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L	<0.000010	----	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L	<0.00010	----	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L	<0.00010	----	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L	<0.00030	----	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L	0.00222	----	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L	0.000619	----	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L	<0.00050	----	----	----	----

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	EERI-12	----	----	----	----
					Client sampling date / time	24-Aug-2024 13:50	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402570-001	----	----	----	----
						Result	----	----	----	----
Dissolved Metals										
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0801	----	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L		<0.00030	----	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	----	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	----	----	----	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	----	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----

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

alsglobal.com

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402570**	Page	: 1 of 10
Amendment	: 1		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 26-Aug-2024 08:00
PO	: ----	Issue Date	: 20-Dec-2024 17:21
C-O-C number	: ----		
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value 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
Method Blank (MB) Values								
Anions and Nutrients	QC-MRG6-1619634 001	----	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0280 B mg/L	0.005 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group : Analytical Method / 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) EERI-12	E298	24-Aug-2024	02-Sep-2024	28 days	9 days	✓	04-Sep-2024	28 days	11 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-12	E235.Cl	24-Aug-2024	27-Aug-2024	28 days	3 days	✓	27-Aug-2024	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE EERI-12	E378-U	24-Aug-2024	20-Dec-2024	3 days	118 days	× EHT	20-Dec-2024	3 days	118 days	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-12	E235.F	24-Aug-2024	27-Aug-2024	28 days	3 days	✓	27-Aug-2024	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-12	E235.NO3-L	24-Aug-2024	27-Aug-2024	3 days	3 days	✓	27-Aug-2024	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-12	E235.NO2-L	24-Aug-2024	27-Aug-2024	3 days	3 days	✓	27-Aug-2024	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EERI-12	E235.SO4	24-Aug-2024	27-Aug-2024	28 days	3 days	✓	27-Aug-2024	28 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* 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 (lab preserved) EERI-12	E509	24-Aug-2024	04-Sep-2024	28 days	11 days	✓	04-Sep-2024	28 days	11 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EERI-12	E421	24-Aug-2024	04-Sep-2024	180 days	11 days	✓	05-Sep-2024	180 days	12 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-12	E353-L	24-Aug-2024	----	----	----		01-Sep-2024	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-12	E290	24-Aug-2024	27-Aug-2024	14 days	3 days	✓	28-Aug-2024	14 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-12	E100	24-Aug-2024	27-Aug-2024	28 days	3 days	✓	28-Aug-2024	28 days	4 days	✓
Physical Tests : pH by Meter										
HDPE EERI-12	E108	24-Aug-2024	27-Aug-2024	0.25 hrs	75 hrs	× EHTR-FM	28-Aug-2024	0.25 hrs	93 hrs	× EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container EERI-12	C-13 DIC	24-Aug-2024	----	----	----		16-Dec-2024	----	114 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container EERI-12	H-2+O-18	24-Aug-2024	----	----	----		16-Dec-2024	----	114 days	

Legend & Qualifier Definitions

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	1619641	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	1628903	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	1619635	1	19	5.2	5.0	✓
Conductivity in Water	E100	1619642	1	17	5.8	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633044	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1622083	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1619634	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1619637	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1619638	1	19	5.2	5.0	✓
pH by Meter	E108	1619640	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1619639	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1619641	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	1628903	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	1619635	1	19	5.2	5.0	✓
Conductivity in Water	E100	1619642	1	17	5.8	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633044	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1622083	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1619634	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1619637	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1619638	1	19	5.2	5.0	✓
pH by Meter	E108	1619640	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1619639	1	19	5.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1619641	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	1628903	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	1619635	1	19	5.2	5.0	✓
Conductivity in Water	E100	1619642	1	17	5.8	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633044	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1622083	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*
Method Blanks (MB) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1619634	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1619637	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1619638	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1619639	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1628903	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	1619635	1	19	5.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633044	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1622083	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1619634	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1619637	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1619638	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1619639	1	19	5.2	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
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18	Water		See attached report.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1			

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **FJ2402570**	Page	: 1 of 12
Amendment	: **1**		
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 26-Aug-2024 08:00
PO	: ----	Date Analysis Commenced	: 27-Aug-2024
C-O-C number	: ----	Issue Date	: 20-Dec-2024 17:21
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Maya Urquhart	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1619640)											
FJ2402565-003	Anonymous	pH	----	E108	0.10	pH units	8.07	8.10	0.371%	4%	----
Physical Tests (QC Lot: 1619641)											
FJ2402565-003	Anonymous	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	368	370	0.519%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	368	370	0.519%	20%	----
Physical Tests (QC Lot: 1619642)											
FJ2402565-003	Anonymous	Conductivity	----	E100	2.0	µS/cm	1190	1180	0.337%	10%	----
Anions and Nutrients (QC Lot: 1619634)											
FJ2402565-001	Anonymous	Fluoride	16984-48-8	E235.F	0.100	mg/L	0.164	0.144	0.020	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1619635)											
FJ2402565-001	Anonymous	Chloride	16887-00-6	E235.Cl	2.50	mg/L	3.47	2.65	0.82	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1619637)											
FJ2402565-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1619638)											
FJ2402565-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1619639)											
FJ2402565-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	310	307	1.04%	20%	----
Anions and Nutrients (QC Lot: 1628903)											
FJ2402570-001	EERI-12	Ammonia, total (as N)	7664-41-7	E298	0.0250	mg/L	0.589	0.594	0.876%	20%	----
Anions and Nutrients (QC Lot: 1818198)											
FJ2402387-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1628803)											
FJ2402570-001	EERI-12	Carbon, dissolved inorganic [DIC]	----	E353-L	1.50	mg/L	121	122	0.546%	20%	----
Dissolved Metals (QC Lot: 1622083)											
FJ2402565-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0014	0.0014	0.00005	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00215	0.00221	2.56%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0259	0.0261	0.484%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1622083) - continued											
FJ2402565-001	Anonymous	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	0.064	0.061	0.003	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	137	133	2.36%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00073	0.00073	0.000006	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.797	0.787	1.27%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0414	0.0401	3.24%	20%	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	51.5	50.7	1.58%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.470	0.469	0.410%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00138	0.00132	4.15%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00121	0.00115	0.00006	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	6.26	6.42	2.61%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00108	0.00106	0.00002	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.24	5.16	1.57%	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	47.5	48.0	0.917%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.633	0.598	5.66%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	110	109	0.877%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00265	0.00256	3.45%	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	0.0011	<0.0010	0.00006	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1633044)											
FJ2402564-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1619641)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1619642)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Anions and Nutrients (QCLot: 1619634)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1619635)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1619637)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	# 0.0280	B
Anions and Nutrients (QCLot: 1619638)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1619639)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1628903)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1818198)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 1628803)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1622083)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1622083) - continued						
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1633044)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1619640)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1619641)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.9	85.0	115	----
Physical Tests (QCLot: 1619642)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	100	90.0	110	----
Anions and Nutrients (QCLot: 1619634)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1619635)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1619637)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1619638)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 1619639)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 1628903)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	94.4	85.0	115	----
Anions and Nutrients (QCLot: 1818198)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1628803)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	107	80.0	120	----
Dissolved Metals (QCLot: 1622083)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	94.7	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.6	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	99.0	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	96.5	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1622083) - continued									
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.5	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	97.9	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	97.2	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.1	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	95.4	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.1	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	97.2	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	95.7	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	96.8	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	97.9	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	97.5	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	96.4	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	93.9	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	91.6	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	96.3	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	98.2	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	95.8	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	102	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.5	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	89.9	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.1	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.0	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	93.8	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	94.0	80.0	120	----

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: 1619634)										
FJ2402565-002	Anonymous	Fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1619635)										
FJ2402565-002	Anonymous	Chloride	16887-00-6	E235.Cl	101 mg/L	100 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1619637)										
FJ2402565-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.55 mg/L	2.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1619638)										
FJ2402565-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.488 mg/L	0.5 mg/L	97.7	75.0	125	----
Anions and Nutrients (QCLot: 1619639)										
FJ2402565-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 1628903)										
FJ2402580-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0958 mg/L	0.1 mg/L	95.8	75.0	125	----
Anions and Nutrients (QCLot: 1818198)										
FJ2402417-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0319 mg/L	0.03 mg/L	106	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1628803)										
FJ2402580-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1622083)										
FJ2402565-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.184 mg/L	0.2 mg/L	92.0	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0377 mg/L	0.04 mg/L	94.3	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00998 mg/L	0.01 mg/L	99.8	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.090 mg/L	0.1 mg/L	89.7	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00386 mg/L	0.004 mg/L	96.4	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00981 mg/L	0.01 mg/L	98.1	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0387 mg/L	0.04 mg/L	96.8	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.84 mg/L	2 mg/L	92.1	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0901 mg/L	0.1 mg/L	90.1	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	----	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0195 mg/L	0.02 mg/L	97.5	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: 1622083) - continued										
FJ2402565-002	Anonymous	Nickel, dissolved	7440-02-0	E421	0.0361 mg/L	0.04 mg/L	90.4	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	9.32 mg/L	10 mg/L	93.2	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.52 mg/L	4 mg/L	88.1	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0189 mg/L	0.02 mg/L	94.6	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.10 mg/L	10 mg/L	91.0	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00389 mg/L	0.004 mg/L	97.3	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	20.4 mg/L	20 mg/L	102	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0407 mg/L	0.04 mg/L	102	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00399 mg/L	0.004 mg/L	99.8	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0365 mg/L	0.04 mg/L	91.3	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00408 mg/L	0.004 mg/L	102	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0956 mg/L	0.1 mg/L	95.6	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.365 mg/L	0.4 mg/L	91.3	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0372 mg/L	0.04 mg/L	92.9	70.0	130	----
Dissolved Metals (QCLot: 1633044)										
FJ2402564-002	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000940 mg/L	0 mg/L	94.0	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page of

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Fort St. John
Work Order Reference
FJ2402570

Telephone : +1 250 261 5517

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

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

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	amanda@westernwater.ca
Email 2	warren@westernwater.ca

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge m
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge n
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge n
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge n
☐ Same day [E2] If received by 10am M-S - 200% rush surch
Additional fees may apply to rush requests on week
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, pleas

Project Information	
ALS Client Code / QUOTE #:	VA24-WESW100-001
Job / Project #:	24-065-01PG
PO / AFE:	
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):

ALS Contact: Ian Chen

Sampler: AB

Analysis Request

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

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	major and minor cations	~~total~~ dissolved metals+Hg	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4)	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	isotopes				SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	EERI-12	24-Aug-24	13:50	GW	9	X		X	X	X	X	X	X	X	X	X						

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

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

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

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

dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane) and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
5.9				10			

SHIPMENT RELEASE (client use)		
Released by:	Date:	Time:
	Aug 26 24	7:30

INITIAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:
	Aug 26/24	8:00

FINAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:
	Aug 28	6:15

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25018**
Client Project ID:	**FJ2402570**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0125	FJ2402570-001	EER1-12	24-Aug-24	28-Aug-24	Dissolved Gas	0.006	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	2.18		0.02	<0.01	20.54	77.26	100.0

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25018**
Client Project ID:	**FJ2402570**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes												
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0125	FJ2402570-001	EER1-12	0.007				42.34	135.90								-15.3							

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25018**
Client Project ID:	**FJ2402570**

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0125	FJ2402570-001	EER1-12		Headspace present; EPA method RSKSOP-175 not used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25018**
Client File No:	**FJ2402570**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0125	FJ2402570-001	EER1-12	24-Aug-24	28-Aug-24	-24.1	0.01	-185	0.03	-8.2	

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

CERTIFICATE OF ANALYSIS

Work Order	: **FJ2402439**			
Amendment	: **1**			
Client	: **Western Water Associates Ltd**	Laboratory	:	ALS Environmental - Vancouver
Contact	: Warren Grafton	Account Manager	:	Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	:	8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 541 1030	Telephone	:	+1 604 253 4188
Project	: 24-065-01PG	Date Samples Received	:	16-Aug-2024 13:45
PO	: ----	Date Analysis Commenced	:	24-Aug-2024
C-O-C number	: ----	Issue Date	:	20-Dec-2024 17:13
Sampler	: A B			
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program			
Quote number	: VA24-WESW100-001			
No. of samples received	: 2			
No. of samples analysed	: 2			

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Sam Silveira	Analyst	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 units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.

Workorder Comments

Amendment (20/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data. Orthophosphate was added to FJ2402439 -1 and -2

alsglobal.com

Qualifiers

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-13	EERI-15	----	----	----
					Client sampling date / time	16-Aug-2024 09:30	16-Aug-2024 12:00	----	----	----
						FJ2402439-001	FJ2402439-002	----	----	----
						Result	Result	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		667	643	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		109	221	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		776	864	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm		1680	1800	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		91.7	48.4	----	----	----
pH	----	E108/VA	0.10	pH units		9.02	9.35	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		1090	1100	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		1.03	1.01	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		16.7	47.3	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		0.636	0.420	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.0500 DLDS	<0.0500 DLDS	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.0510	<0.0510	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0100 DLDS	<0.0100 DLDS	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		145	67.2	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		195	174	----	----	----
Ion Balance										
Anion sum	----	EC101/VA	0.10	meq/L		19.0	20.0	----	----	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-13	EERI-15	----	----	----
					Client sampling date / time	16-Aug-2024 09:30	16-Aug-2024 12:00	----	----	----
						FJ2402439-001	FJ2402439-002	----	----	----
						Result	Result	----	----	----
Ion Balance										
Cation sum	----	EC101/VA	0.10	meq/L		19.7	19.9	----	----	----
Ion balance (cations/anions)	----	EC101/VA	0.010	%		104	99.5	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%		1.81	-0.25	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.293	0.0409	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		0.00019	0.00038	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00404	0.00243	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.0693	0.138	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000020	<0.000020	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.283	0.321	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		24.7	12.0	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		0.000042	0.000043	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	0.00084	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		<0.00020	0.00077	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		0.030	<0.010	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0092	0.0777	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		7.29	4.48	----	----	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-13	EERI-15	----	----	----
					Client sampling date / time	16-Aug-2024 09:30	16-Aug-2024 12:00	----	----	----
						FJ2402439-001	FJ2402439-002	----	----	----
						Result	Result	----	----	----
Dissolved Metals										
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.0138	0.00177	----	----	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.00463	0.00709	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		<0.00050	0.00101	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.050	0.056	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		1.99	2.45	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00150	0.00192	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		0.000161	0.000366	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		5.33	3.56	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000020 DLM	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		408	432	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.168	0.0699	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		51.8	23.7	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00020	<0.00020	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00030	<0.00030	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.00418	0.00164	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		0.00060	0.00076	----	----	----

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	EERI-13	EERI-15	----	----	----
					Client sampling date / time	16-Aug-2024 09:30	16-Aug-2024 12:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402439-001	FJ2402439-002	----	----	----
						Result	Result	----	----	----
Dissolved Metals										
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0042	0.0540	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L		<0.00060 DLM	<0.00060 DLM	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	Field	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	----	----	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	see attached	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	----	----	----

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

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402439**	Page	: 1 of 12
Amendment	: 1		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 16-Aug-2024 13:45
PO	: ----	Issue Date	: 20-Dec-2024 17:13
C-O-C number	: ----		
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Matrix Spike (MS) Recoveries								
Dissolved Metals	FJ2402439-002	EERI-15	Silver, dissolved	7440-22-4	E421	51.6 % MS-Ag	70.0-130%	Recovery less than lower data quality objective

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group : Analytical Method / 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) EERI-13	E298	16-Aug-2024	24-Aug-2024	28 days	8 days	✓	25-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EERI-15	E298	16-Aug-2024	24-Aug-2024	28 days	8 days	✓	25-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-13	E235.Cl	16-Aug-2024	24-Aug-2024	28 days	8 days	✓	24-Aug-2024	28 days	8 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-15	E235.Cl	16-Aug-2024	24-Aug-2024	28 days	8 days	✓	24-Aug-2024	28 days	8 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-15	E378-U	16-Aug-2024	20-Dec-2024	52 hrs	3022 hrs	× EHT	20-Dec-2024	52 hrs	3025 hrs	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-13	E378-U	16-Aug-2024	20-Dec-2024	55 hrs	3025 hrs	× EHT	20-Dec-2024	55 hrs	3027 hrs	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-13	E235.F	16-Aug-2024	24-Aug-2024	28 days	8 days	✓	24-Aug-2024	28 days	8 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-15	E235.F	16-Aug-2024	24-Aug-2024	28 days	8 days	✓	24-Aug-2024	28 days	8 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-13	E235.NO3-L	16-Aug-2024	24-Aug-2024	3 days	8 days	× EHT	24-Aug-2024	3 days	8 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-15	E235.NO3-L	16-Aug-2024	24-Aug-2024	3 days	8 days	× EHT	24-Aug-2024	3 days	8 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-13	E235.NO2-L	16-Aug-2024	24-Aug-2024	3 days	8 days	× EHT	24-Aug-2024	3 days	8 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-15	E235.NO2-L	16-Aug-2024	24-Aug-2024	3 days	8 days	× EHT	24-Aug-2024	3 days	8 days	× EHT
Anions and Nutrients : Sulfate in Water by IC										
HDPE EERI-13	E235.SO4	16-Aug-2024	24-Aug-2024	28 days	8 days	✓	24-Aug-2024	28 days	8 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EERI-15	E235.SO4	16-Aug-2024	24-Aug-2024	28 days	8 days	✓	24-Aug-2024	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) EERI-13	E509	16-Aug-2024	28-Aug-2024	28 days	12 days	✓	28-Aug-2024	28 days	12 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) EERI-15	E509	16-Aug-2024	28-Aug-2024	28 days	12 days	✓	28-Aug-2024	28 days	12 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 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 (lab preserved) EERI-13	E421	16-Aug-2024	27-Aug-2024	180 days	11 days	✓	29-Aug-2024	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EERI-15	E421	16-Aug-2024	27-Aug-2024	180 days	11 days	✓	29-Aug-2024	180 days	13 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-13	E353-L	16-Aug-2024	----	----	----		27-Aug-2024	14 days	11 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-15	E353-L	16-Aug-2024	----	----	----		01-Sep-2024	14 days	16 days	× EHT
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-13	E290	16-Aug-2024	24-Aug-2024	14 days	8 days	✓	25-Aug-2024	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-15	E290	16-Aug-2024	24-Aug-2024	14 days	8 days	✓	25-Aug-2024	14 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-13	E100	16-Aug-2024	24-Aug-2024	28 days	8 days	✓	25-Aug-2024	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-15	E100	16-Aug-2024	24-Aug-2024	28 days	8 days	✓	25-Aug-2024	28 days	9 days	✓
Physical Tests : pH by Meter										
HDPE EERI-15	E108	16-Aug-2024	24-Aug-2024	0.25 hrs	190 hrs	× EHTR-FM	25-Aug-2024	0.25 hrs	218 hrs	× EHTR-FM

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* Rec	*Holding Times* Actual	*Eval*	*Analysis Date*	*Holding Times* Rec	*Holding Times* Actual	*Eval*
Physical Tests : pH by Meter										
HDPE										
EERI-13	E108	16-Aug-2024	24-Aug-2024	0.25 hrs	192 hrs	× EHTR-FM	25-Aug-2024	0.25 hrs	221 hrs	× EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container										
EERI-13	C-13 DIC	16-Aug-2024	----	----	----		16-Dec-2024	----	122 days	
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Amber glass vial										
EERI-15	C-13 DIC	16-Aug-2024	----	----	----		16-Dec-2024	----	122 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container										
EERI-13	H-2+O-18	16-Aug-2024	----	----	----		16-Dec-2024	----	122 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container										
EERI-15	H-2+O-18	16-Aug-2024	----	----	----		16-Dec-2024	----	122 days	

Legend & Qualifier Definitions

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	1614429	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1614432	1	19	5.2	5.0	✓
Conductivity in Water	E100	1614430	1	19	5.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628802	2	26	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1621727	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1618390	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614431	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614434	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614435	1	19	5.2	5.0	✓
pH by Meter	E108	1614428	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1614436	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1614429	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1614432	1	19	5.2	5.0	✓
Conductivity in Water	E100	1614430	1	19	5.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628802	2	26	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1621727	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1618390	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614431	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614434	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614435	1	19	5.2	5.0	✓
pH by Meter	E108	1614428	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1614436	1	19	5.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1614429	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1614432	1	19	5.2	5.0	✓
Conductivity in Water	E100	1614430	1	19	5.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628802	2	26	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1621727	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1618390	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*
Method Blanks (MB) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614431	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614434	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614435	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1614436	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1614432	1	19	5.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628802	2	26	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1621727	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1618390	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614431	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614434	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614435	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1614436	1	19	5.2	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
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18	Water		See attached report.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1			

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **FJ2402439**	Page	: 1 of 12
Amendment	: **1**		
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 16-Aug-2024 13:45
PO	: ----	Date Analysis Commenced	: 24-Aug-2024
C-O-C number	: ----	Issue Date	: 20-Dec-2024 17:13
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia
Sam Silveira	Analyst	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: 1614428)											
FJ2402435-002	Anonymous	pH	----	E108	0.10	pH units	6.81	6.74	1.03%	4%	----
Physical Tests (QC Lot: 1614429)											
FJ2402435-002	Anonymous	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	348	350	0.752%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	348	350	0.752%	20%	----
Physical Tests (QC Lot: 1614430)											
FJ2402435-002	Anonymous	Conductivity	----	E100	2.0	µS/cm	6690	6610	1.20%	10%	----
Anions and Nutrients (QC Lot: 1614431)											
FJ2402473-014	Anonymous	Fluoride	16984-48-8	E235.F	0.200	mg/L	0.474	0.469	0.006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1614432)											
FJ2402473-014	Anonymous	Chloride	16887-00-6	E235.Cl	5.00	mg/L	78.7	78.0	0.835%	20%	----
Anions and Nutrients (QC Lot: 1614434)											
FJ2402473-014	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0500	mg/L	<0.0500	<0.0500	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1614435)											
FJ2402473-014	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1614436)											
FJ2402473-014	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	3.00	mg/L	882	876	0.748%	20%	----
Anions and Nutrients (QC Lot: 1614677)											
FJ2402439-001	EERI-13	Ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	1.03	1.04	0.990%	20%	----
Anions and Nutrients (QC Lot: 1818198)											
FJ2402387-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1619759)											
FJ2402439-001	EERI-13	Carbon, dissolved inorganic [DIC]	----	E353-L	5.00	mg/L	195	189	3.05%	20%	----
Organic / Inorganic Carbon (QC Lot: 1628802)											
FJ2402439-002	EERI-15	Carbon, dissolved inorganic [DIC]	----	E353-L	1.50	mg/L	174	175	0.632%	20%	----
Dissolved Metals (QC Lot: 1618390)											
FJ2402439-001	EERI-13	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.293	0.295	0.651%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00019	0.00018	0.000001	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00404	0.00392	2.94%	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: 1618390) - continued											
FJ2402439-001	EERI-13	Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0693	0.0684	1.29%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.283	0.287	1.45%	20%	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	24.7	25.5	3.44%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000042	0.000045	0.000004	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.030	0.029	0.0010	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	0.0092	0.0094	0.0003	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	7.29	7.06	3.18%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0138	0.0132	5.00%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00463	0.00436	5.94%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.99	1.96	1.67%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00150	0.00141	0.00009	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000161	0.000158	0.000003	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.33	5.27	1.11%	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	408	386	5.58%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.168	0.157	6.51%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	51.8	50.0	3.42%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00418	0.00407	2.64%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00060	0.00060	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: 1618390) - continued											
FJ2402439-001	EERI-13	Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0042	0.0041	0.00009	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1621727)											
FJ2402302-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1614429)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1614430)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Anions and Nutrients (QCLot: 1614431)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1614432)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1614434)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1614435)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1614436)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1614677)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1818198)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 1619759)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 1628802)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1618390)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1618390) - continued						
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1621727)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1614428)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1614429)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.7	85.0	115	----
Physical Tests (QCLot: 1614430)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	101	90.0	110	----
Anions and Nutrients (QCLot: 1614431)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1614432)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 1614434)									
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: 1614435)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1614436)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 1614677)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 1818198)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1619759)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	98.0	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1628802)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 1618390)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	96.9	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	106	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.3	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	99.7	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1618390) - continued									
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.8	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.8	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.9	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.9	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	94.6	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	99.5	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	106	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	98.8	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	96.9	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	105	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	98.5	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	98.7	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	100	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	94.9	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	95.3	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	100	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	95.1	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.1	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	98.6	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	99.5	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.3	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	99.6	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	96.5	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	96.5	80.0	120	----

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: 1614431)										
FJ2402473-013	Anonymous	Fluoride	16984-48-8	E235.F	10.3 mg/L	10 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1614432)										
FJ2402473-013	Anonymous	Chloride	16887-00-6	E235.Cl	1030 mg/L	1000 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1614434)										
FJ2402473-013	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	25.7 mg/L	25 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1614435)										
FJ2402473-013	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	5.01 mg/L	5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 1614436)										
FJ2402473-013	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1030 mg/L	1000 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1614677)										
FJ2402439-002	EERI-15	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1818198)										
FJ2402417-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0319 mg/L	0.03 mg/L	106	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1619759)										
FJ2402448-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1628802)										
KS2403486-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1618390)										
FJ2402439-002	EERI-15	Aluminum, dissolved	7429-90-5	E421	0.196 mg/L	0.2 mg/L	97.8	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0406 mg/L	0.04 mg/L	101	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00869 mg/L	0.01 mg/L	86.9	70.0	130	----
		Boron, dissolved	7440-42-8	E421	ND mg/L	----	ND	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00375 mg/L	0.004 mg/L	93.7	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00994 mg/L	0.01 mg/L	99.4	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0388 mg/L	0.04 mg/L	97.1	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0183 mg/L	0.02 mg/L	91.7	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0173 mg/L	0.02 mg/L	86.5	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.83 mg/L	2 mg/L	91.6	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1618390) - continued										
FJ2402439-002	EERI-15	Lithium, dissolved	7439-93-2	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0211 mg/L	0.02 mg/L	106	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0356 mg/L	0.04 mg/L	88.9	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	11.4 mg/L	10 mg/L	114	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	4.10 mg/L	4 mg/L	102	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0369 mg/L	0.04 mg/L	92.2	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	10.1 mg/L	10 mg/L	101	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00206 mg/L	0.004 mg/L	51.6	70.0	130	MS-Ag
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	----	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00359 mg/L	0.004 mg/L	89.8	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0171 mg/L	0.02 mg/L	85.7	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0384 mg/L	0.04 mg/L	96.1	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00383 mg/L	0.004 mg/L	95.7	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.355 mg/L	0.4 mg/L	88.8	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0423 mg/L	0.04 mg/L	106	70.0	130	----
Dissolved Metals (QCLot: 1621727)										
FJ2402302-002	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000982 mg/L	0 mg/L	98.2	70.0	130	----

Qualifiers

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

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page ___ of ___

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Environmental Division
Fort St. John
Work Order Reference
FJ2402439

Telephone : +1 250 261 5517

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☐ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	warren@westernwater.ca
Email 2	avi@westernwater.ca
Email 3	lisa@westernwater.ca
Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	amanda@westernwater.ca
Email 2	warren@westernwater.ca

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges app
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharg
☐ 3 day [P3] if received by 3pm M-F - 25% rush surchar
☐ 2 day [P2] if received by 3pm M-F - 50% rush surchar
☐ 1 day [E] if received by 3pm M-F - 100% rush surchar
☐ Same day [E2] if received by 10am M-S - 200% rush s
Additional fees may apply to rush requests on
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested
Analy

Project Information		Oil and Gas Required Fields (client use)	
ALS Client Code / QUOTE #:	VA24-WESW100-001	AFE/Cost Center:	PO#
Job / Project #:	24-065-01PG	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact: Ian Chen	Sampler: AB

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	major and minor cations	[illegible]	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4)	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	Isotopes	Hold	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRE	SUSPECTED HAZARD (see notes)
	EERI-13	16-Aug-24	09:30	GW	9	X		X	X	X	X	X	X	X	X	X	X			
	EERI-15	16-Aug-24	12:00	GW	9	X		X	X	X	X	X	X	X	X	X	X			

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

FJAE Shipping & Receiving
___ Call Out ___ Expedite
___ Priority
___ # of Coolers ✓ Air
___ # of Carboys ___ Ground

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane), and δ13C of DIC
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
9.8				6.10	9.10		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	AUG-16/24	13:45		08/16/24	1:45		Rcvd 17Aug2024	11:10am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25008**
Client Project ID:	**FJ2402439**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0059	FJ2402439-001	EERI-13	16-Aug-24	21-Aug-24	Dissolved Gas	0.007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.19		0.01	<0.01	17.80	81.99	100.0
IB-25-0060	FJ2402439-002	EERI-15	16-Aug-24	21-Aug-24	Dissolved Gas	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.09		<0.01	<0.01	20.94	78.96	100.0

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25008**
Client Project ID:	**FJ2402439**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes													
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0059	FJ2402439-001	EERI-13	0.008				3.64	147.45															
IB-25-0060	FJ2402439-002	EERI-15	0.009				2.19	367.12															

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25008**
Client Project ID:	**FJ2402439**

ISOBRINE solutions

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0059	FJ2402439-001	EERI-13		Headspace present; EPA method RSKSOP-175 not used.
IB-25-0060	FJ2402439-002	EERI-15		Headspace present; EPA method RSKSOP-175 not used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25008**
Client File No:	**FJ2402439**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0059	FJ2402439-001	EERI-13	16-Aug-24	21-Aug-24	-25.1	0.02	-194	0.07	-11.7	
IB-25-0060	FJ2402439-002	EERI-15	16-Aug-24	21-Aug-24	-23.0	0.06	-179	0.24	-8.4	

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

ALS Canada Ltd.

CERTIFICATE OF ANALYSIS

Work Order	: **FJ2402517**				
Amendment	: **2**				
Client	: **Western Water Associates Ltd**		Laboratory	:	ALS Environmental - Vancouver
Contact	: Stefanie Schoenberger		Account Manager	:	Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8		Address	:	8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----		Telephone	:	+1 604 253 4188
Project	: 24-065-01PG		Date Samples Received	:	22-Aug-2024 08:10
PO	: ----		Date Analysis Commenced	:	28-Aug-2024
C-O-C number	: ----		Issue Date	:	04-Feb-2025 13:58
Sampler	: A B				
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program				
Quote number	: VA24-WESW100-001				
No. of samples received	: 1				
No. of samples analysed	: 1				

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Manpreet Kaur	Laboratory Analyst	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Wingyee Cheng	Analyst- General	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 units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.

Workorder Comments

Amendment (20/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data. Orthophosphate was added to FJ2402517-1.

Amendment (04/02/2025): This report has been amended and re-released to allow the reporting of additional analytical data. Dissolved metals reporting has been turned on.

Qualifiers

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EER1-14	----	----	----	----
					Client sampling date / time	21-Aug-2024 19:00	----	----	----	----
						FJ2402517-001	----	----	----	----
						Result	----	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		1290	----	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	----	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	----	----	----	----
Alkalinity, phenolphthalein (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	----	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		1290	----	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm		5030	----	----	----	----
pH	----	E108/VA	0.10	pH units		7.05	----	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		4270	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		0.804	----	----	----	----
Bromide	24959-67-9	E235.Br-L/VA	0.050	mg/L		<1.00 DLDS	----	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		12.1	----	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		<0.400 DLDS	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.100 DLDS	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.102	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0200 DLDS	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		<0.0010	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		2100	----	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		343	----	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: EER1-14	----	----	----	----
					Client sampling date / time: 21-Aug-2024 19:00	----	----	----	----
					FJ2402517-001	----	----	----	----
					Result	----	----	----	----
Ion Balance									
Anion sum	----	EC101/VA	0.10	meq/L	69.8	----	----	----	----
Cation sum	----	EC101/VA	0.10	meq/L	71.4	----	----	----	----
Ion balance (cations/anions)	----	EC101/VA	0.010	%	102	----	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%	1.13	----	----	----	----
Dissolved Metals									
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L	<0.0050	----	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L	<0.00050	----	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L	0.00096	----	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L	0.00518	----	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L	<0.000100	----	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L	<0.000250	----	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L	0.396	----	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L	<0.0000250	----	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L	286	----	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L	<0.000050	----	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L	<0.00250	----	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L	<0.00050	----	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L	<0.00100	----	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L	2.56	----	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L	<0.000250	----	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L	0.0187	----	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EER1-14	----	----	----	----
					Client sampling date / time	21-Aug-2024 19:00	----	----	----	----
						FJ2402517-001	----	----	----	----
						Result	----	----	----	----
Dissolved Metals										
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		266	----	----	----	----
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.387	----	----	----	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	----	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.000642	----	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		<0.00250	----	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.250	----	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		6.26	----	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00298	----	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		<0.000250	----	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		6.40	----	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000050	----	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		802	----	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		2.68	----	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		751	----	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00100	----	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000050	----	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00050	----	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00050	----	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00150	----	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		<0.00050	----	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.00330	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	EER1-14	----	----	----	----
					Client sampling date / time	21-Aug-2024 19:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402517-001	----	----	----	----
						Result	----	----	----	----
Dissolved Metals										
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00250	----	----	----	----
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		<0.0050	----	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00020	mg/L		<0.00260 DLM	----	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	----	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	----	----	----	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	----	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----

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

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402517**	Page	: 1 of 10
Amendment	: **2**		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Stefanie Schoenberger	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: ----	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 22-Aug-2024 08:10
PO	: ----	Issue Date	: 04-Feb-2025 13:59
C-O-C number	: ----		
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 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) EER1-14	E298	21-Aug-2024	28-Aug-2024	28 days	7 days	✓	28-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE EER1-14	E235.Br-L	21-Aug-2024	28-Aug-2024	28 days	6 days	✓	28-Aug-2024	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EER1-14	E235.Cl	21-Aug-2024	28-Aug-2024	28 days	6 days	✓	28-Aug-2024	28 days	6 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE EER1-14	E378-U	21-Aug-2024	20-Dec-2024	3 days	121 days	× EHT	20-Dec-2024	3 days	121 days	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE EER1-14	E235.F	21-Aug-2024	28-Aug-2024	28 days	6 days	✓	28-Aug-2024	28 days	6 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EER1-14	E235.NO3-L	21-Aug-2024	28-Aug-2024	3 days	6 days	× EHT	28-Aug-2024	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EER1-14	E235.NO2-L	21-Aug-2024	28-Aug-2024	3 days	6 days	× EHT	28-Aug-2024	3 days	6 days	× EHT

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE EER1-14	E235.SO4	21-Aug-2024	28-Aug-2024	28 days	6 days	✓	28-Aug-2024	28 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) EER1-14	E509	21-Aug-2024	30-Aug-2024	28 days	8 days	✓	30-Aug-2024	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EER1-14	E421	21-Aug-2024	28-Aug-2024	180 days	7 days	✓	30-Aug-2024	180 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EER1-14	E353-L	21-Aug-2024	----	----	----		28-Aug-2024	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EER1-14	E290	21-Aug-2024	28-Aug-2024	14 days	6 days	✓	28-Aug-2024	14 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE EER1-14	E100	21-Aug-2024	28-Aug-2024	28 days	6 days	✓	28-Aug-2024	28 days	7 days	✓
Physical Tests : pH by Meter										
HDPE EER1-14	E108	21-Aug-2024	28-Aug-2024	0.25 hrs	150 hrs	× EHTR-FM	28-Aug-2024	0.25 hrs	159 hrs	× EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container EER1-14	C-13 DIC	21-Aug-2024	----	----	----		16-Dec-2024	----	117 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Amber glass vial EER1-14	H-2+O-18	21-Aug-2024	----	----	----		16-Dec-2024	----	117 days	

Legend & Qualifier Definitions

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	1620130	1	10	10.0	5.0	✓
Ammonia by Fluorescence	E298	1620480	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	1620125	1	9	11.1	5.0	✓
Chloride in Water by IC	E235.Cl	1620124	1	11	9.0	5.0	✓
Conductivity in Water	E100	1620131	1	7	14.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1621887	1	17	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1625235	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1619425	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1620123	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1620126	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1620127	1	11	9.0	5.0	✓
pH by Meter	E108	1620132	1	7	14.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1620128	1	11	9.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1620130	1	10	10.0	5.0	✓
Ammonia by Fluorescence	E298	1620480	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	1620125	1	9	11.1	5.0	✓
Chloride in Water by IC	E235.Cl	1620124	1	11	9.0	5.0	✓
Conductivity in Water	E100	1620131	1	7	14.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1621887	1	17	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1625235	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1619425	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1620123	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1620126	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1620127	1	11	9.0	5.0	✓
pH by Meter	E108	1620132	1	7	14.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1620128	1	11	9.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1620130	1	10	10.0	5.0	✓
Ammonia by Fluorescence	E298	1620480	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	1620125	1	9	11.1	5.0	✓
Chloride in Water by IC	E235.Cl	1620124	1	11	9.0	5.0	✓
Conductivity in Water	E100	1620131	1	7	14.2	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Dissolved Inorganic Carbon by Combustion	E353-L	1621887	1	17	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1625235	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1619425	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1620123	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1620126	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1620127	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1620128	1	11	9.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1620480	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	1620125	1	9	11.1	5.0	✓
Chloride in Water by IC	E235.Cl	1620124	1	11	9.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1621887	1	17	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1625235	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1619425	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1620123	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1620126	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1620127	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1620128	1	11	9.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Bromide in Water by IC (Low Level)	E235.Br-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18	Water		See attached report.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1			

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **FJ2402517**	Page	: 1 of 13
Amendment	: **2**		
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Stefanie Schoenberger	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: ----	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 22-Aug-2024 08:10
PO	: ----	Date Analysis Commenced	: 28-Aug-2024
C-O-C number	: ----	Issue Date	: 04-Feb-2025 13:58
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Manpreet Kaur	Laboratory Analyst	Vancouver Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Wingyee Cheng	Analyst- General	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: 1620130)											
FJ2402517-001	EER1-14	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	1290	1300	0.386%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		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	1290	1300	0.386%	20%	----
Physical Tests (QC Lot: 1620131)											
FJ2402517-001	EER1-14	Conductivity	----	E100	2.0	µS/cm	5030	5140	2.16%	10%	----
Physical Tests (QC Lot: 1620132)											
FJ2402517-001	EER1-14	pH	----	E108	0.10	pH units	7.05	7.04	0.142%	4%	----
Anions and Nutrients (QC Lot: 1620123)											
FJ2402517-001	EER1-14	Fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1620124)											
FJ2402517-001	EER1-14	Chloride	16887-00-6	E235.Cl	10.0	mg/L	12.1	13.1	0.99	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1620125)											
FJ2402517-001	EER1-14	Bromide	24959-67-9	E235.Br-L	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1620126)											
FJ2402517-001	EER1-14	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: 1620127)											
FJ2402517-001	EER1-14	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: 1620128)											
FJ2402517-001	EER1-14	Sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	2100	2100	0.0918%	20%	----
Anions and Nutrients (QC Lot: 1620480)											
FJ2402517-001	EER1-14	Ammonia, total (as N)	7664-41-7	E298	0.0500	mg/L	0.804	0.810	0.647%	20%	----
Anions and Nutrients (QC Lot: 1818198)											
FJ2402387-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1621887)											
FJ2402517-001	EER1-14	Carbon, dissolved inorganic [DIC]	----	E353-L	5.00	mg/L	343	354	3.29%	20%	----
Dissolved Metals (QC Lot: 1619425)											
FJ2402517-001	EER1-14	Aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1619425) - continued											
FJ2402517-001	EER1-14	Antimony, dissolved	7440-36-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	0.00096	0.00104	0.00008	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.00518	0.00519	0.214%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.050	mg/L	0.396	0.396	0.0007	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000250	mg/L	<0.0000250	<0.0000250	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.250	mg/L	286	295	3.27%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.050	mg/L	2.56	2.60	1.52%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.0187	0.0189	0.0002	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	266	272	2.40%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00050	mg/L	0.387	0.393	1.52%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.000642	0.000553	0.000089	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.250	mg/L	6.26	6.38	1.96%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00100	mg/L	0.00298	0.00300	0.00002	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.250	mg/L	6.40	6.40	0.0609%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.250	mg/L	802	824	2.60%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00100	mg/L	2.68	2.72	1.42%	20%	----
		Sulfur, dissolved	7704-34-9	E421	2.50	mg/L	751	740	1.50%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1619425) - continued											
FJ2402517-001	EER1-14	Uranium, dissolved	7440-61-1	E421	0.000050	mg/L	0.00330	0.00327	0.989%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00260	mg/L	<0.00260	<0.00260	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1625235)											
FJ2402517-001	EER1-14	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1620130)						
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: 1620131)						
Conductivity	----	E100	1	µS/cm	1.3	----
Anions and Nutrients (QCLot: 1620123)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1620124)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1620125)						
Bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 1620126)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1620127)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1620128)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1620480)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1818198)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 1621887)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1619425)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1619425) - continued						
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1625235)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1620130)									
Alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	90.2	75.0	125	----
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.9	85.0	115	----
Physical Tests (QCLot: 1620131)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	99.4	90.0	110	----
Physical Tests (QCLot: 1620132)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Anions and Nutrients (QCLot: 1620123)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 1620124)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1620125)									
Bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 1620126)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1620127)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 1620128)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 1620480)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	96.2	85.0	115	----
Anions and Nutrients (QCLot: 1818198)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1621887)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	96.8	80.0	120	----
Dissolved Metals (QCLot: 1619425)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	98.6	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	100	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	102	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1619425) - continued									
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	93.0	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.9	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	92.1	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.6	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	96.4	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	98.6	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	99.3	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.3	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.7	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	94.1	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.1	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	96.4	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	95.6	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.6	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	98.4	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.0	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	97.4	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	103	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	96.7	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	99.7	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	94.1	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	98.4	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	96.2	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	95.1	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.2	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	94.6	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.4	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	95.5	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	96.4	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	104	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	94.9	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	95.3	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	96.0	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier

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: 1620123)										
FJ2402569-001	Anonymous	Fluoride	16984-48-8	E235.F	20.8 mg/L	20 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 1620124)										
FJ2402569-001	Anonymous	Chloride	16887-00-6	E235.Cl	2040 mg/L	2000 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1620125)										
FJ2402569-001	Anonymous	Bromide	24959-67-9	E235.Br-L	10.6 mg/L	10 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 1620126)										
FJ2402569-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	51.1 mg/L	50 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1620127)										
FJ2402569-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	10.3 mg/L	10 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1620128)										
FJ2402569-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	2030 mg/L	2000 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1620480)										
KS2403352-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1818198)										
FJ2402417-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0319 mg/L	0.03 mg/L	106	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1621887)										
VA24C1262-020	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	K
Dissolved Metals (QCLot: 1619425)										
FJ2402542-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.193 mg/L	0.2 mg/L	96.6	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0207 mg/L	0.02 mg/L	103	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0369 mg/L	0.04 mg/L	92.3	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00892 mg/L	0.01 mg/L	89.2	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.096 mg/L	0.1 mg/L	95.9	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00386 mg/L	0.004 mg/L	96.5	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00963 mg/L	0.01 mg/L	96.3	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0186 mg/L	0.02 mg/L	93.1	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0184 mg/L	0.02 mg/L	91.9	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.86 mg/L	2 mg/L	92.8	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0187 mg/L	0.02 mg/L	93.3	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0970 mg/L	0.1 mg/L	97.0	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1619425) - continued										
FJ2402542-001	Anonymous	Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0194 mg/L	0.02 mg/L	96.9	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0375 mg/L	0.04 mg/L	93.8	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	10.6 mg/L	10 mg/L	106	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	4.02 mg/L	4 mg/L	100	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0194 mg/L	0.02 mg/L	97.0	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	9.32 mg/L	10 mg/L	93.2	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00398 mg/L	0.004 mg/L	99.6	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	20.2 mg/L	20 mg/L	101	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0395 mg/L	0.04 mg/L	98.7	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00365 mg/L	0.004 mg/L	91.2	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0158 mg/L	0.02 mg/L	78.8	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0397 mg/L	0.04 mg/L	99.2	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0184 mg/L	0.02 mg/L	92.1	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0991 mg/L	0.1 mg/L	99.1	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.381 mg/L	0.4 mg/L	95.2	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0382 mg/L	0.04 mg/L	95.4	70.0	130	----
Dissolved Metals (QCLot: 1625235)										
FJ2402541-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000966 mg/L	0 mg/L	96.6	70.0	130	----

Qualifiers

Qualifier	Description
K	*Matrix Spike recovery outside ALS DQO due to sample matrix effects.*

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page _ of

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Fort St. John
Work Order Reference
FJ2402517

Telephone : +1 250 261 5617

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax amanda@westernwater.ca
Email 2 warren@westernwater.ca

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge min
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge mir
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge mir
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge mir
☐ Same day [E2] if received by 10am M-S - 200% rush surchar
Additional fees may apply to rush requests on weeker
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please

Project Information

ALS Client Code / QUOTE #:	VA24-WESW100-001
Job / Project #:	24-065-01PG
PO / AFE:	
LSD:	
ALS Lab Work Order # (ALS use only):	

Oil and Gas Required Fields (client use)

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

ALS Contact: Ian Chen Sampler: AB

Analysis Request

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

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	major and minor cations	[redacted]	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4)	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	isotopes				SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	FFR1-14	21-Aug-24	19:00	GW	9	X		X	X	X	X	X	X	X	X	X						

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

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

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

dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane), and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
2.6				6.6	8.3	5.9	

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
	Aug 22/24	8:00

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	Aug 22/24	8:10

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	8.23	12:00 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

6 Coolers

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25016**
Client Project ID:	**FJ2402517**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0123	FJ2402517-001	EER1-14	21-Aug-24	28-Aug-24	Dissolved Gas	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	8.32		0.01	0.01	19.97	71.68	100.0

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25016**
Client Project ID:	**FJ2402517**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes												
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0123	FJ2402517-001	EER1-14	0.017				222.76	446.57								-11.7							

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25016**
Client Project ID:	**FJ2402517**

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0123	FJ2402517-001	EER1-14		Headspace present; EPA method RSKSOP-175 not used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25016**
Client File No:	**FJ2402517**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0123	FJ2402517-001	EER1-14	21-Aug-24	28-Aug-24	-24.1	0.05	-190	0.29	-3.7	

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

CERTIFICATE OF ANALYSIS

Work Order	: **FJ2402494**			
Amendment	: **1**			
Client	: **Western Water Associates Ltd**	Laboratory	:	ALS Environmental - Vancouver
Contact	: Warren Grafton	Account Manager	:	Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	:	8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 541 1030	Telephone	:	+1 604 253 4188
Project	: 24-065-01PG	Date Samples Received	:	21-Aug-2024 07:40
PO	: ----	Date Analysis Commenced	:	23-Aug-2024
C-O-C number	: ----	Issue Date	:	20-Dec-2024 17:16
Sampler	: A B			
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program			
Quote number	: VA24-WESW100-001			
No. of samples received	: 2			
No. of samples analysed	: 2			

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Daniel Shabestani	Lab Assistant	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Ghazaleh Khanmirzaei	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	no units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.

Workorder Comments

Amendment (20/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data. Orthophosphate was added to FJ2402494 -1, and -2.

Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-17	EERI-16	----	----	----
					Client sampling date / time	20-Aug-2024 13:00	20-Aug-2024 16:45	----	----	----
						FJ2402494-001	FJ2402494-002	----	----	----
						Result	Result	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		293	<1.0	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	228	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	1090	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		293	1320	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm		547	5190	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		288	1010	----	----	----
pH	----	E108/VA	0.10	pH units		7.58	12.3	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		315	1390	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		0.103	7.43	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		4.92	<25.0 DLDS	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		0.179	<1.00 DLDS	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.0050	<0.250 DLDS	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.0051	<0.255	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0010	<0.0500 DLDS	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		15.8	48.8	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		72.2	0.85	----	----	----
Ion Balance										
Anion sum	----	EC101/VA	0.10	meq/L		6.33	27.4	----	----	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-17	EERI-16	----	----	----
					Client sampling date / time	20-Aug-2024 13:00	20-Aug-2024 16:45	----	----	----
						FJ2402494-001	FJ2402494-002	----	----	----
						Result	Result	----	----	----
Ion Balance										
Cation sum	----	EC101/VA	0.10	meq/L		5.94	26.3	----	----	----
Ion balance (cations/anions)	----	EC101/VA	0.010	%		93.8	96.0	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%		-3.18	-2.05	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		<0.0010	0.0079	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00010	0.00021	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00055	0.00034	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.139	0.428	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000020	<0.000040 DLA	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	<0.000100 DLA	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.029	0.154	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000050	<0.0000100 DLA	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		83.2	406	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		<0.000010	0.000027	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	<0.00100 DLA	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00036	<0.00020 DLA	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		<0.00020	<0.00040 DLA	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		0.253	<0.020 DLA	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	<0.000100 DLA	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0137	0.148	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		19.4	0.0696	----	----	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-17	EERI-16	----	----	----
					Client sampling date / time	20-Aug-2024 13:00	20-Aug-2024 16:45	----	----	----
						FJ2402494-001	FJ2402494-002	----	----	----
						Result	Result	----	----	----
Dissolved Metals										
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.137	<0.00020 DLA	----	----	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.00261	0.00205	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		0.00062	<0.00100 DLA	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.050	<0.100 DLA	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		2.05	4.26	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00036	0.00377	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		<0.000050	0.000556	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		3.92	1.12	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000020 DLA	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		2.85	124	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.346	0.740	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		5.79	26.5	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00020	<0.00040 DLA	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		0.000012	<0.000020 DLA	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00010	<0.00020 DLA	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	<0.00020 DLA	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00030	<0.00060 DLA	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		<0.00010	<0.00020 DLA	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.00150	<0.000020 DLA	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00050	<0.00100 DLA	----	----	----

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	EERI-17	EERI-16	----	----	----
					Client sampling date / time	20-Aug-2024 13:00	20-Aug-2024 16:45	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402494-001	FJ2402494-002	----	----	----
						Result	Result	----	----	----
Dissolved Metals										
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0016	0.0036	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L		<0.00030	<0.00040 DLA	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	Field	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	----	----	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	see attached	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	----	----	----

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

alsglobal.com

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402494**	Page	: 1 of 11
Amendment	: 1		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 21-Aug-2024 07:40
PO	: ----	Issue Date	: 20-Dec-2024 17:16
C-O-C number	: ----		
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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 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) EERI-16	E298	20-Aug-2024	24-Aug-2024	28 days	4 days	✓	25-Aug-2024	28 days	5 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EERI-17	E298	20-Aug-2024	24-Aug-2024	28 days	4 days	✓	25-Aug-2024	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-16	E235.Cl	20-Aug-2024	23-Aug-2024	28 days	3 days	✓	23-Aug-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-17	E235.Cl	20-Aug-2024	23-Aug-2024	28 days	3 days	✓	23-Aug-2024	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-16	E378-U	20-Aug-2024	20-Dec-2024	48 hrs	2922 hrs	× EHT	20-Dec-2024	48 hrs	2924 hrs	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-17	E378-U	20-Aug-2024	20-Dec-2024	51 hrs	2925 hrs	× EHT	20-Dec-2024	51 hrs	2928 hrs	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-16	E235.F	20-Aug-2024	23-Aug-2024	28 days	3 days	✓	23-Aug-2024	28 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 : Fluoride in Water by IC										
HDPE										
EERI-17	E235.F	20-Aug-2024	23-Aug-2024	28 days	3 days	✓	23-Aug-2024	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
EERI-16	E235.NO3-L	20-Aug-2024	23-Aug-2024	3 days	3 days	✓	23-Aug-2024	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
EERI-17	E235.NO3-L	20-Aug-2024	23-Aug-2024	3 days	3 days	✓	23-Aug-2024	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
EERI-16	E235.NO2-L	20-Aug-2024	23-Aug-2024	3 days	3 days	✓	23-Aug-2024	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
EERI-17	E235.NO2-L	20-Aug-2024	23-Aug-2024	3 days	3 days	✓	23-Aug-2024	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
EERI-16	E235.SO4	20-Aug-2024	23-Aug-2024	28 days	3 days	✓	23-Aug-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
EERI-17	E235.SO4	20-Aug-2024	23-Aug-2024	28 days	3 days	✓	23-Aug-2024	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
EERI-16	E509	20-Aug-2024	28-Aug-2024	28 days	8 days	✓	28-Aug-2024	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
EERI-17	E509	20-Aug-2024	28-Aug-2024	28 days	8 days	✓	28-Aug-2024	28 days	8 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										
HDPE - dissolved (lab preserved)										
EERI-16	E421	20-Aug-2024	25-Aug-2024	180 days	5 days	✓	27-Aug-2024	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
EERI-17	E421	20-Aug-2024	25-Aug-2024	180 days	5 days	✓	27-Aug-2024	180 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE										
EERI-16	E353-L	20-Aug-2024	----	----	----		27-Aug-2024	14 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE										
EERI-17	E353-L	20-Aug-2024	----	----	----		27-Aug-2024	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
EERI-16	E290	20-Aug-2024	23-Aug-2024	14 days	3 days	✓	23-Aug-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
EERI-17	E290	20-Aug-2024	23-Aug-2024	14 days	3 days	✓	23-Aug-2024	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
EERI-16	E100	20-Aug-2024	23-Aug-2024	28 days	3 days	✓	23-Aug-2024	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
EERI-17	E100	20-Aug-2024	23-Aug-2024	28 days	3 days	✓	23-Aug-2024	28 days	3 days	✓
Physical Tests : pH by Meter										
HDPE										
EERI-16	E108	20-Aug-2024	23-Aug-2024	0.25 hrs	70 hrs	× EHTR-FM	23-Aug-2024	0.25 hrs	73 hrs	× EHTR-FM

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* Rec	*Holding Times* Actual	*Eval*	*Analysis Date*	*Holding Times* Rec	*Holding Times* Actual	*Eval*
Physical Tests : pH by Meter										
HDPE										
EERI-17	E108	20-Aug-2024	23-Aug-2024	0.25 hrs	74 hrs	× EHTR-FM	23-Aug-2024	0.25 hrs	77 hrs	× EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container										
EERI-16	C-13 DIC	20-Aug-2024	----	----	----		16-Dec-2024	----	118 days	
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container										
EERI-17	C-13 DIC	20-Aug-2024	----	----	----		16-Dec-2024	----	118 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container										
EERI-16	H-2+O-18	20-Aug-2024	----	----	----		16-Dec-2024	----	118 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container										
EERI-17	H-2+O-18	20-Aug-2024	----	----	----		16-Dec-2024	----	118 days	

Legend & Qualifier Definitions

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	1613346	1	8	12.5	5.0	✓
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1613348	1	13	7.6	5.0	✓
Conductivity in Water	E100	1613345	1	15	6.6	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1619759	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1621151	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1612425	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1613351	1	7	14.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1613349	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1613350	1	15	6.6	5.0	✓
pH by Meter	E108	1613344	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1613347	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1613346	1	8	12.5	5.0	✓
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1613348	1	13	7.6	5.0	✓
Conductivity in Water	E100	1613345	1	15	6.6	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1619759	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1621151	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1612425	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1613351	1	7	14.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1613349	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1613350	1	15	6.6	5.0	✓
pH by Meter	E108	1613344	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1613347	1	13	7.6	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1613346	1	8	12.5	5.0	✓
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1613348	1	13	7.6	5.0	✓
Conductivity in Water	E100	1613345	1	15	6.6	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1619759	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1621151	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1612425	1	18	5.5	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1613351	1	7	14.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1613349	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1613350	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1613347	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1614677	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1613348	1	13	7.6	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1619759	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1621151	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1612425	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1613351	1	7	14.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1613349	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1613350	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1613347	1	13	7.6	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
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18	Water		See attached report.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1			

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **FJ2402494**	Page	: 1 of 12
Amendment	: **1**		
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 21-Aug-2024 07:40
PO	: ----	Date Analysis Commenced	: 23-Aug-2024
C-O-C number	: ----	Issue Date	: 20-Dec-2024 17:16
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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*
Daniel Shabestani	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Ghazaleh Khanmirzaei	Analyst	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver Inorganics, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1613344)											
VA24C1181-001	Anonymous	pH	----	E108	0.10	pH units	7.68	7.69	0.130%	4%	----
Physical Tests (QC Lot: 1613345)											
VA24C1181-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	219	219	0.00%	10%	----
Physical Tests (QC Lot: 1613346)											
VA24C1181-001	Anonymous	Alkalinity, bicarbonate (as CaCO3)	----	E290	2.0	mg/L	105	105	0.191%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	2.0	mg/L	<2.0	<2.0	0.00%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	2.0	mg/L	<2.0	<2.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	105	105	0.191%	20%	----
Anions and Nutrients (QC Lot: 1613347)											
FJ2402494-001	EERI-17	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	15.8	15.8	0.113%	20%	----
Anions and Nutrients (QC Lot: 1613348)											
FJ2402494-001	EERI-17	Chloride	16887-00-6	E235.Cl	0.50	mg/L	4.92	4.93	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1613349)											
FJ2402494-001	EERI-17	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1613350)											
FJ2402494-001	EERI-17	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1613351)											
FJ2402494-001	EERI-17	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.179	0.168	0.012	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1614677)											
FJ2402439-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	1.03	1.04	0.990%	20%	----
Anions and Nutrients (QC Lot: 1818198)											
FJ2402387-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1619759)											
FJ2402439-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	5.00	mg/L	195	189	3.05%	20%	----
Dissolved Metals (QC Lot: 1612425)											
YL2401217-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0190	0.0182	4.57%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00022	0.00022	0.000001	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00199	0.00198	0.0210%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0378	0.0380	0.497%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1612425) - continued											
YL2401217-001	Anonymous	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	0.017	0.018	0.0003	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000057	0.0000055	0.0000002	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	23.3	23.6	1.28%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00164	0.00161	0.00002	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.044	0.045	0.001	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	0.0045	0.0045	0.00006	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	7.19	7.22	0.400%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00214	0.00224	4.43%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000666	0.000660	0.846%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00123	0.00119	0.00004	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.776	0.770	0.791%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00087	0.00077	0.00010	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000176	0.000180	0.000004	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	0.834	0.861	3.26%	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	7.64	8.01	4.61%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.128	0.129	1.15%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.70	10.0	3.06%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000373	0.000391	4.64%	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	<0.0010	<0.0010	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

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: 1621151)											
FJ2402494-001	EERI-17	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1613345)						
Conductivity	----	E100	1	µS/cm	1.9	----
Physical Tests (QCLot: 1613346)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1613347)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1613348)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1613349)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1613350)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1613351)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1614677)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1818198)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 1619759)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1612425)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1612425) - continued						
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1621151)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1613344)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1613345)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	99.0	90.0	110	----
Physical Tests (QCLot: 1613346)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 1613347)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	99.5	90.0	110	----
Anions and Nutrients (QCLot: 1613348)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 1613349)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	98.1	90.0	110	----
Anions and Nutrients (QCLot: 1613350)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.1	90.0	110	----
Anions and Nutrients (QCLot: 1613351)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.5	90.0	110	----
Anions and Nutrients (QCLot: 1614677)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 1818198)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1619759)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	98.0	80.0	120	----
Dissolved Metals (QCLot: 1612425)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	99.8	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	98.1	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.0	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	95.0	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	89.6	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1612425) - continued									
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	95.7	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	95.6	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.6	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.3	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	97.3	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.4	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	89.1	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	96.8	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.2	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	98.1	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	111	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	98.5	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	103	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	110	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	91.0	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.9	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	112	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	92.8	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.2	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	96.4	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.0	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	97.7	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	97.2	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	91.6	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	95.9	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	93.8	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	95.5	80.0	120	----

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: 1613347)										
FJ2402494-002	EERI-16	Sulfate (as SO4)	14808-79-8	E235.SO4	5110 mg/L	5000 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1613348)										
FJ2402494-002	EERI-16	Chloride	16887-00-6	E235.Cl	5160 mg/L	5000 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1613349)										
FJ2402494-002	EERI-16	Nitrate (as N)	14797-55-8	E235.NO3-L	127 mg/L	125 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1613350)										
FJ2402494-002	EERI-16	Nitrite (as N)	14797-65-0	E235.NO2-L	25.3 mg/L	25 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1613351)										
FJ2402494-002	EERI-16	Fluoride	16984-48-8	E235.F	40.5 mg/L	50 mg/L	81.1	75.0	125	----
Anions and Nutrients (QCLot: 1614677)										
FJ2402439-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1818198)										
FJ2402417-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0319 mg/L	0.03 mg/L	106	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1619759)										
FJ2402448-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1612425)										
YL2401217-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.192 mg/L	0.2 mg/L	96.0	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0194 mg/L	0.02 mg/L	97.3	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0384 mg/L	0.04 mg/L	95.9	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00905 mg/L	0.01 mg/L	90.5	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.090 mg/L	0.1 mg/L	89.6	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00396 mg/L	0.004 mg/L	98.9	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.92 mg/L	2 mg/L	95.9	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0878 mg/L	0.1 mg/L	87.8	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0193 mg/L	0.02 mg/L	96.6	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: 1612425) - continued										
YL2401217-002	Anonymous	Molybdenum, dissolved	7439-98-7	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	9.67 mg/L	10 mg/L	96.7	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.78 mg/L	4 mg/L	94.6	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0392 mg/L	0.04 mg/L	98.0	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.48 mg/L	10 mg/L	94.8	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00399 mg/L	0.004 mg/L	99.8	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	18.8 mg/L	20 mg/L	94.0	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0418 mg/L	0.04 mg/L	104	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	0.0189 mg/L	0.02 mg/L	94.5	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0382 mg/L	0.04 mg/L	95.6	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00366 mg/L	0.004 mg/L	91.5	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0984 mg/L	0.1 mg/L	98.4	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.387 mg/L	0.4 mg/L	96.8	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----
Dissolved Metals (QCLot: 1621151)										
FJ2402494-002	EERI-16	Mercury, dissolved	7439-97-6	E509	0.0000970 mg/L	0 mg/L	97.0	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page of

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Fort St. John
Work Order Reference
FJ2402494

Telephone : +1 250 261 5517

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax amanda@westernwater.ca
Email 2 warren@westernwater.ca

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge
☐ 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-standard TAT.
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Client Code / QUOTE #: VA24-WESW100-001
Job / Project #: 24-065-01PG
PO / AFE:
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):

ALS Contact: Ian Chen Sampler: AB

Analysis Request

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	major and minor cations	~~total metals~~ ~~Hg~~	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	Isotopes	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	EERI-17	20-Aug-24	13:00	GW	9	X		X	X	X	X	X	X	X	X	X			
	EERI-16	20-Aug-24	16:45	GW	9	X		X	X	X	X	X	X	X	X	X			

FJAE Shipping & Receiving
__ Call Out __ Expedite
__ Priority
1 # of Coolers ✓ Air
__ # of Carboys __ Ground

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

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

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

dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane), and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
9.1				7.2			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
	Aug 20/24	7:40

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	Aug 21/24	7:40

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	Aug 21	9:15

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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25012**
Client Project ID:	**FJ2402494**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0098	FJ2402494-001	EERI-17	20-Aug-24	23-Aug-24	Dissolved Gas	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.88		<0.01	<0.01	20.36	78.76	100.0
IB-25-0099	FJ2402494-002	EERI-16	20-Aug-24	23-Aug-24	Dissolved Gas	29.8	1.15	0.017	0.004	0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.08				0.45	9.12	

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25012**
Client Project ID:	**FJ2402494**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes												
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0098	FJ2402494-001	EERI-17	0.017				29.29	844.51								-20.2							
IB-25-0099	FJ2402494-002	EERI-16	35.242	2.756	0.056	0.014	1.47	16.74	-53.4	-28.15							-294	-185					

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25012**
Client Project ID:	**FJ2402494**

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0098	FJ2402494-001	EERI-17		Headspace present; EPA method RSKSOP-175 not used.
IB-25-0099	FJ2402494-002	EERI-16		EPA method RSKSOP-175 used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25012**
Client File No:	**FJ2402494**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0098	FJ2402494-001	EERI-17	20-Aug-24	23-Aug-24	-21.3	0.05	-166	0.42	-12.1	
IB-25-0099	FJ2402494-002	EERI-16	20-Aug-24	23-Aug-24	-21.2	0.03	-168	0.10	-16.3	-16.2

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

CERTIFICATE OF ANALYSIS

Work Order	:	**FJ2402417**		
Client	:	**Western Water Associates Ltd**	Laboratory	: ALS Environmental - Vancouver
Contact	:	Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	:	#201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	:	250 541 1030	Telephone	: +1 604 253 4188
Project	:	24-065-01PG	Date Samples Received	: 15-Aug-2024 08:30
PO	:	----	Date Analysis Commenced	: 21-Aug-2024
C-O-C number	:	----	Issue Date	: 16-Dec-2024 17:56
Sampler	:	A B		
Site	:	BC Energy Regulator RFI54525001 - Groundwater Sampling Program		
Quote number	:	VA24-WESW100-001		
No. of samples received	:	2		
No. of samples analysed	:	2		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Chamoi Beckford	Lab Assistant	Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Ghazaleh Khanmirzaei	Analyst	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	no units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EFRI-18A	EFRI-26	----	----	----
					Client sampling date / time	14-Aug-2024 10:50	14-Aug-2024 14:50	----	----	----
						FJ2402417-001	FJ2402417-002	----	----	----
						Result	Result	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		565	1700	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		565	1700	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm		4510	3270	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		1550	76.5	----	----	----
pH	----	E108/VA	0.10	pH units		7.56	8.16	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		3740	2160	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		1.16	2.94	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		<10.0 DLDS	14.4	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		<0.400 DLDS	<0.400 DLDS	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.100 DLDS	<0.100 DLDS	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.102	<0.102	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0200 DLDS	<0.0200 DLDS	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		2320	255	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		166	506	----	----	----
Ion Balance										
Anion sum	----	EC101/VA	0.10	meq/L		59.6	39.7	----	----	----
Cation sum	----	EC101/VA	0.10	meq/L		55.4	37.9	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EFRI-18A	EFRI-26	----	----	----
					Client sampling date / time	14-Aug-2024 10:50	14-Aug-2024 14:50	----	----	----
						FJ2402417-001	FJ2402417-002	----	----	----
						Result	Result	----	----	----
Ion Balance										
Ion balance (cations/anions)	----	EC101/VA	0.010	%		93.0	95.5	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%		-3.65	-2.32	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.0067	0.0052	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00020 DLA	<0.00050 DLA	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00348	0.00099	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.00904	0.0289	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000040 DLA	<0.000100 DLA	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000100 DLA	<0.000250 DLA	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.218	0.564	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000100 DLA	<0.0000250 DLA	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		319	17.5	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		<0.000020 DLA	0.000086	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00100 DLA	<0.00250 DLA	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00166	<0.00050 DLA	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		<0.00040 DLA	<0.00100 DLA	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		5.67	<0.050 DLA	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000100 DLA	<0.000250 DLA	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0780	0.325	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		183	7.97	----	----	----
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.304	0.0699	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EFRI-18A	EFRI-26	----	----	----
					Client sampling date / time	14-Aug-2024 10:50	14-Aug-2024 14:50	----	----	----
						FJ2402417-001	FJ2402417-002	----	----	----
						Result	Result	----	----	----
Dissolved Metals										
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.000709	0.00230	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		0.00340	0.00336	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.100 DLA	<0.250 DLA	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		6.99	4.46	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00315	0.00357	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		<0.000100 DLA	0.000381	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		6.35	2.99	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000020 DLA	<0.000050 DLA	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		551	828	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		2.09	0.524	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		839	92.8	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00040 DLA	<0.00100 DLA	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000020 DLA	<0.000050 DLA	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00020 DLA	<0.00050 DLA	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00020 DLA	<0.00050 DLA	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00060 DLA	<0.00150 DLA	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		0.00023	<0.00050 DLA	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.00354	0.000163	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00100 DLA	<0.00250 DLA	----	----	----
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0472	0.0142	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: EFRI-18A	EFRI-26	----	----	----
					Client sampling date / time: 14-Aug-2024 10:50	14-Aug-2024 14:50	----	----	----
					FJ2402417-001	FJ2402417-002	----	----	----
					Result	Result	----	----	----
Dissolved Metals									
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L	<0.00040 DLA	0.00304	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-	Field	Field	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-	Field	Field	----	----	----
Stable Isotope									
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB	see attached	see attached	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW	See attached	See attached	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW	See attached	See attached	----	----	----

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

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402417**	Page	: 1 of 11
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 15-Aug-2024 08:30
PO	: ----	Issue Date	: 16-Dec-2024 17:57
C-O-C number	: ----		
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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 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) EFRI-18A	E298	14-Aug-2024	21-Aug-2024	28 days	7 days	✓	22-Aug-2024	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EFRI-26	E298	14-Aug-2024	21-Aug-2024	28 days	7 days	✓	22-Aug-2024	28 days	8 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EFRI-26	E235.Cl	14-Aug-2024	22-Aug-2024	28 days	7 days	✓	22-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EFRI-18A	E235.Cl	14-Aug-2024	22-Aug-2024	28 days	8 days	✓	22-Aug-2024	28 days	8 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EFRI-26	E235.F	14-Aug-2024	22-Aug-2024	28 days	7 days	✓	22-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EFRI-18A	E235.F	14-Aug-2024	22-Aug-2024	28 days	8 days	✓	22-Aug-2024	28 days	8 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EFRI-26	E235.NO3-L	14-Aug-2024	22-Aug-2024	3 days	7 days	× EHT	22-Aug-2024	3 days	7 days	× EHT

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 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										
EFRI-18A	E235.NO3-L	14-Aug-2024	22-Aug-2024	3 days	8 days	× EHT	22-Aug-2024	3 days	8 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
EFRI-26	E235.NO2-L	14-Aug-2024	22-Aug-2024	3 days	7 days	× EHT	22-Aug-2024	3 days	7 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
EFRI-18A	E235.NO2-L	14-Aug-2024	22-Aug-2024	3 days	8 days	× EHT	22-Aug-2024	3 days	8 days	× EHT
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
EFRI-26	E235.SO4	14-Aug-2024	22-Aug-2024	28 days	7 days	✓	22-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
EFRI-18A	E235.SO4	14-Aug-2024	22-Aug-2024	28 days	8 days	✓	22-Aug-2024	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
EFRI-18A	E509	14-Aug-2024	22-Aug-2024	28 days	8 days	✓	22-Aug-2024	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
EFRI-26	E509	14-Aug-2024	22-Aug-2024	28 days	8 days	✓	22-Aug-2024	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
EFRI-18A	E421	14-Aug-2024	22-Aug-2024	180 days	8 days	✓	23-Aug-2024	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
EFRI-26	E421	14-Aug-2024	22-Aug-2024	180 days	8 days	✓	23-Aug-2024	180 days	9 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EFRI-18A	E353-L	14-Aug-2024	----	----	----		21-Aug-2024	14 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EFRI-26	E353-L	14-Aug-2024	----	----	----		21-Aug-2024	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EFRI-26	E290	14-Aug-2024	22-Aug-2024	14 days	7 days	✓	22-Aug-2024	14 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EFRI-18A	E290	14-Aug-2024	22-Aug-2024	14 days	8 days	✓	22-Aug-2024	14 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE EFRI-26	E100	14-Aug-2024	22-Aug-2024	28 days	7 days	✓	22-Aug-2024	28 days	8 days	✓
Physical Tests : Conductivity in Water										
HDPE EFRI-18A	E100	14-Aug-2024	22-Aug-2024	28 days	8 days	✓	22-Aug-2024	28 days	8 days	✓
Physical Tests : pH by Meter										
HDPE EFRI-26	E108	14-Aug-2024	22-Aug-2024	0.25 hrs	178 hrs	× EHTR-FM	22-Aug-2024	0.25 hrs	187 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EFRI-18A	E108	14-Aug-2024	22-Aug-2024	0.25 hrs	182 hrs	× EHTR-FM	22-Aug-2024	0.25 hrs	191 hrs	× EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Amber glass/Teflon lined cap EFRI-18A	C-13 DIC	14-Aug-2024	----	----	----		16-Dec-2024	----	124 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*	
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Amber glass/Teflon lined cap										
EFRI-26	C-13 DIC	14-Aug-2024	----	----	----		16-Dec-2024	----	124 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Amber glass/Teflon lined cap										
EFRI-18A	H-2+O-18	14-Aug-2024	----	----	----		16-Dec-2024	----	124 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Amber glass/Teflon lined cap										
EFRI-26	H-2+O-18	14-Aug-2024	----	----	----		16-Dec-2024	----	124 days	

Legend & Qualifier Definitions

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	1609492	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	1609379	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	1609484	1	20	5.0	5.0	✓
Conductivity in Water	E100	1609491	1	20	5.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1609409	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1609735	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1609560	1	10	10.0	5.0	✓
Fluoride in Water by IC	E235.F	1609487	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1609485	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1609486	1	20	5.0	5.0	✓
pH by Meter	E108	1609490	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1609483	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1609492	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	1609379	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	1609484	1	20	5.0	5.0	✓
Conductivity in Water	E100	1609491	1	20	5.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1609409	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1609735	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1609560	1	10	10.0	5.0	✓
Fluoride in Water by IC	E235.F	1609487	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1609485	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1609486	1	20	5.0	5.0	✓
pH by Meter	E108	1609490	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1609483	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1609492	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	1609379	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	1609484	1	20	5.0	5.0	✓
Conductivity in Water	E100	1609491	1	20	5.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1609409	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1609735	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1609560	1	10	10.0	5.0	✓
Fluoride in Water by IC	E235.F	1609487	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1609485	1	19	5.2	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	1609486	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1609483	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1609379	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	1609484	1	20	5.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1609409	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1609735	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1609560	1	10	10.0	5.0	✓
Fluoride in Water by IC	E235.F	1609487	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1609485	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1609486	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1609483	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18 Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water		See attached report.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **FJ2402417**	Page	: 1 of 10
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 15-Aug-2024 08:30
PO	: ----	Date Analysis Commenced	: 21-Aug-2024
C-O-C number	: ----	Issue Date	: 16-Dec-2024 17:57
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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*
Chamoi Beckford	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Ghazaleh Khanmirzaei	Analyst	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver Inorganics, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1609490)											
KS2403348-001	Anonymous	pH	----	E108	0.10	pH units	8.03	8.02	0.125%	4%	----
Physical Tests (QC Lot: 1609491)											
KS2403348-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	241	242	0.414%	10%	----
Physical Tests (QC Lot: 1609492)											
KS2403348-001	Anonymous	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	126	125	0.402%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	126	125	0.402%	20%	----
Anions and Nutrients (QC Lot: 1609379)											
FJ2402417-001	EFRI-18A	Ammonia, total (as N)	7664-41-7	E298	0.0500	mg/L	1.16	1.17	1.15%	20%	----
Anions and Nutrients (QC Lot: 1609483)											
FJ2402417-001	EFRI-18A	Sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	2320	2320	0.228%	20%	----
Anions and Nutrients (QC Lot: 1609484)											
FJ2402417-001	EFRI-18A	Chloride	16887-00-6	E235.Cl	10.0	mg/L	<10.0	<10.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1609485)											
FJ2402417-001	EFRI-18A	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: 1609486)											
FJ2402417-001	EFRI-18A	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: 1609487)											
FJ2402417-001	EFRI-18A	Fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1609409)											
FJ2402417-001	EFRI-18A	Carbon, dissolved inorganic [DIC]	----	E353-L	10.0	mg/L	166	162	2.52%	20%	----
Dissolved Metals (QC Lot: 1609560)											
FJ2402417-001	EFRI-18A	Aluminum, dissolved	7429-90-5	E421	0.0020	mg/L	0.0067	0.0069	0.0002	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00020	mg/L	0.00348	0.00361	3.78%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00020	mg/L	0.00904	0.00892	1.36%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000040	mg/L	<0.000040	<0.000040	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	0.218	0.219	0.474%	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: 1609560) - continued											
FJ2402417-001	EFRI-18A	Cadmium, dissolved	7440-43-9	E421	0.0000100	mg/L	<0.0000100	<0.0000100	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.100	mg/L	319	314	1.39%	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	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00020	mg/L	0.00166	0.00167	0.00001	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.020	mg/L	5.67	5.71	0.590%	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	0.0780	0.0766	1.83%	20%	----
		Magnesium, dissolved	7439-95-4	E421	0.0100	mg/L	183	182	0.706%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00020	mg/L	0.304	0.301	1.06%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000100	mg/L	0.000709	0.000707	0.000002	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00100	mg/L	0.00340	0.00342	0.00002	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.100	mg/L	6.99	6.95	0.565%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00040	mg/L	0.00315	0.00344	0.00029	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.100	mg/L	6.35	6.52	2.56%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.100	mg/L	551	556	0.893%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00040	mg/L	2.09	2.13	2.03%	20%	----
		Sulfur, dissolved	7704-34-9	E421	1.00	mg/L	839	863	2.74%	20%	----
		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	<0.00020	<0.00020	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00020	mg/L	0.00023	0.00024	0.000009	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000020	mg/L	0.00354	0.00358	0.985%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0020	mg/L	0.0472	0.0464	1.56%	20%	----
		Zirconium, dissolved	7440-67-7	E421	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1609735)											
FJ2402417-001	EFRI-18A	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1609491)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 1609492)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1609379)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1609483)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1609484)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1609485)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1609486)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1609487)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Organic / Inorganic Carbon (QCLot: 1609409)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1609560)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1609560) - continued						
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1609735)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1609490)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1609491)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	101	90.0	110	----
Physical Tests (QCLot: 1609492)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 1609379)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 1609483)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 1609484)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1609485)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1609486)									
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: 1609487)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.6	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1609409)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	104	80.0	120	----
Dissolved Metals (QCLot: 1609560)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	93.0	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.6	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	93.0	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	98.1	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	90.6	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	94.6	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.2	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1609560) - continued									
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	95.6	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	95.1	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	93.1	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	93.8	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	96.5	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	100.0	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	90.7	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	92.0	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	95.7	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	93.8	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	97.3	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	95.2	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	93.6	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.8	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	98.8	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	90.3	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	93.9	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	95.8	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	92.0	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	87.5	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	101	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	99.7	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	96.7	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	91.0	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	99.9	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	93.4	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	90.1	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	93.2	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	98.9	80.0	120	----

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: 1609379)										
FJ2402417-002	EFRI-26	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1609483)										
KS2403348-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1609484)										
KS2403348-002	Anonymous	Chloride	16887-00-6	E235.Cl	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1609485)										
KS2403348-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.56 mg/L	2.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1609486)										
KS2403348-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.500 mg/L	0.5 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 1609487)										
KS2403348-002	Anonymous	Fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1609409)										
FJ2402417-002	EFRI-26	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1609560)										
FJ2402417-002	EFRI-26	Aluminum, dissolved	7429-90-5	E421	0.976 mg/L	1 mg/L	97.6	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0960 mg/L	0.1 mg/L	96.0	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.197 mg/L	0.2 mg/L	98.7	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.0458 mg/L	0.05 mg/L	91.5	70.0	130	----
		Boron, dissolved	7440-42-8	E421	ND mg/L	----	ND	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0476 mg/L	0.05 mg/L	95.2	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.192 mg/L	0.2 mg/L	95.8	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0921 mg/L	0.1 mg/L	92.1	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0889 mg/L	0.1 mg/L	88.9	70.0	130	----
		Iron, dissolved	7439-89-6	E421	9.50 mg/L	10 mg/L	95.0	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0931 mg/L	0.1 mg/L	93.1	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	ND mg/L	----	ND	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	----	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0961 mg/L	0.1 mg/L	96.1	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.180 mg/L	0.2 mg/L	90.2	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	47.6 mg/L	50 mg/L	95.1	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1609560) - continued										
FJ2402417-002	EFRI-26	Potassium, dissolved	7440-09-7	E421	ND mg/L	----	ND	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0945 mg/L	0.1 mg/L	94.5	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.194 mg/L	0.2 mg/L	97.0	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	49.2 mg/L	50 mg/L	98.4	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.0174 mg/L	0.02 mg/L	87.2	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	----	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.178 mg/L	0.2 mg/L	88.8	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0972 mg/L	0.1 mg/L	97.2	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0949 mg/L	0.1 mg/L	94.9	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.191 mg/L	0.2 mg/L	95.6	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0948 mg/L	0.1 mg/L	94.8	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.477 mg/L	0.5 mg/L	95.3	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	1.81 mg/L	2 mg/L	90.5	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.201 mg/L	0.2 mg/L	100	70.0	130	----
Dissolved Metals (QCLot: 1609735)										
FJ2402417-002	EFRI-26	Mercury, dissolved	7439-97-6	E509	0.0000926 mg/L	0 mg/L	92.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Fort St. John
Work Order Reference
FJ2402417

Telephone : +1 250 261 5517

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

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

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	amanda@westernwater.ca
Email 2	warren@westernwater.ca

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge mi
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge m
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge m
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge m
☐ Same day [E2] if received by 10am M-S - 200% rush surch
Additional fees may apply to rush requests on week
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, pleas

Project Information	
ALS Client Code / QUOTE #:	VA24-WESW100-001
Job / Project #:	24-065-01PG
PO / AFE:	
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):

ALS Contact: Ian Chen **Sampler:** AB

Analysis Request

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

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	major and minor cations	total metals	F dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	isotopes	pH	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	FERI-18H	14-Aug-24	10:50	GW		X		X	X	X	X	X	X	X	X	X	X			
	FERI-26	14-Aug-24	14:50	GW		X		X	X	X	X	X	X	X	X	X	X			

FJAE Shipping & Receiving
___ Call Out ___ Expedite
___ Priority
1 # of Coolers ✓ Air
___ # of Carboys ___ Ground

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane) and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
1.2				6			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	Aug 15/24			Aug 15/24	8:30		Aug 15	10:15

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2019 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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25006**
Client Project ID:	**FJ2402417**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0055	FJ2402417-001	EFRI-18A	14-Aug-24	21-Aug-24	Dissolved Gas	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	5.06				0.79	16.45	
IB-25-0056	FJ2402417-002	EFRI-26	14-Aug-24	21-Aug-24	Dissolved Gas	0.044	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	4.36		0.03	0.02	18.31	77.23	100.0

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25006**
Client Project ID:	**FJ2402417**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes													
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0055	FJ2402417-001	EFRI-18A	0.009				96.44	25.81								-13.9							
IB-25-0056	FJ2402417-002	EFRI-26	0.097				95.92	277.12								-15.4							

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25006**
Client Project ID:	**FJ2402417**

ISOBRINE solutions

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0055	FJ2402417-001	EFRI-18A		EPA method RSKSOP-175 used.
IB-25-0056	FJ2402417-002	EFRI-26		Headspace present; EPA method RSKSOP-175 not used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25006**
Client File No:	**FJ2402417**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0055	FJ2402417-001	EFRI-18A	14-Aug-24	21-Aug-24	-22.1	0.03	-172	0.11	-7.1	
IB-25-0056	FJ2402417-002	EFRI-26	14-Aug-24	21-Aug-24	-21.5	0.02	-168	0.04	-6.5	

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

CERTIFICATE OF ANALYSIS

Work Order	: **FJ2402435**			
Amendment	: **1**			
Client	: **Western Water Associates Ltd**	Laboratory	:	ALS Environmental - Vancouver
Contact	: Warren Grafton	Account Manager	:	Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	:	8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 541 1030	Telephone	:	+1 604 253 4188
Project	: 24-065-01PG	Date Samples Received	:	15-Aug-2024 17:30
PO	: ----	Date Analysis Commenced	:	24-Aug-2024
C-O-C number	: ----	Issue Date	:	20-Dec-2024 17:12
Sampler	: ----			
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program			
Quote number	: VA24-WESW100-001			
No. of samples received	: 2			
No. of samples analysed	: 2			

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Chamoi Beckford	Lab Assistant	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	no units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.

Workorder Comments

Amendment (20/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data. Orthophosphate was added to FJ2402435-1 and -2.

Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-20	EERI-21	----	----	----
					Client sampling date / time	15-Aug-2024 11:20	15-Aug-2024 14:00	----	----	----
						FJ2402435-001	FJ2402435-002	----	----	----
						Result	Result	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	348	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		61.2	<1.0	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		1840	<1.0	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		1900	348	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm		7230	6690	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		1740	2350	----	----	----
pH	----	E108/VA	0.10	pH units		12.6	6.81	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		2030	6360	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		5.85	23.9	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		<25.0 DLDS	<25.0 DLDS	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		<1.00 DLDS	1.37	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.250 DLDS	<0.250 DLDS	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.255	<0.255	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0500 DLDS	<0.0500 DLDS	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		79.4	4300	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		0.81	147	----	----	----
Ion Balance										
Anion sum	----	EC101/VA	0.10	meq/L		39.6	96.6	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-20	EERI-21	----	----	----
					Client sampling date / time	15-Aug-2024 11:20	15-Aug-2024 14:00	----	----	----
						FJ2402435-001	FJ2402435-002	----	----	----
						Result	Result	----	----	----
Ion Balance										
Cation sum	----	EC101/VA	0.10	meq/L		39.9	93.7	----	----	----
Ion balance (cations/anions)	----	EC101/VA	0.010	%		101	97.0	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%		0.38	-1.52	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.0066	0.0178	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00050 DLA	<0.00050 DLA	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		<0.00050 DLA	0.00990	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		1.22	0.00499	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000100 DLA	<0.000100 DLA	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000250 DLA	<0.000250 DLA	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		<0.050 DLA	0.665	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000250 DLA	<0.0000250 DLA	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		695	412	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		0.000416	<0.000050 DLA	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		0.0150	<0.00250 DLA	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		<0.00050 DLA	0.00255	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		0.00266	<0.00100 DLA	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		<0.050 DLA	138	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		0.000502	<0.000250 DLA	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0647	0.136	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		0.0343	320	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-20	EERI-21	----	----	----
					Client sampling date / time	15-Aug-2024 11:20	15-Aug-2024 14:00	----	----	----
						FJ2402435-001	FJ2402435-002	----	----	----
						Result	Result	----	----	----
Dissolved Metals										
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		<0.00050 DLA	0.241	----	----	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.00366	0.00209	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		<0.00250 DLA	0.00714	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.250 DLA	0.469	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		7.02	37.5	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00871	0.0117	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		<0.000250 DLA	0.000304	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		<0.250 DLA	2.95	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000050 DLA	<0.000050 DLA	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		105	902	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		6.33	0.101	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		14.7	1450	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00100 DLA	<0.00100 DLA	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000050 DLA	<0.000050 DLA	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00050 DLA	<0.00050 DLA	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00050 DLA	<0.00050 DLA	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00150 DLA	<0.00150 DLA	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		<0.00050 DLA	<0.00050 DLA	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		<0.000050 DLA	0.00339	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00250 DLA	<0.00250 DLA	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	EERI-20	EERI-21	----	----	----
					Client sampling date / time	15-Aug-2024 11:20	15-Aug-2024 14:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402435-001	FJ2402435-002	----	----	----
						Result	Result	----	----	----
Dissolved Metals										
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.416	0.0236	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L		<0.00100 DLA	<0.00100 DLA	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	Field	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	----	----	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	see attached	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	----	----	----

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

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402435**	Page	: 1 of 11
Amendment	: 1		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 15-Aug-2024 17:30
PO	: ----	Issue Date	: 20-Dec-2024 17:11
C-O-C number	: ----		
Sampler	: ----		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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 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) EERI-21	E298	15-Aug-2024	24-Aug-2024	28 days	8 days	✓	25-Aug-2024	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EERI-20	E298	15-Aug-2024	24-Aug-2024	28 days	9 days	✓	25-Aug-2024	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-20	E235.Cl	15-Aug-2024	24-Aug-2024	28 days	9 days	✓	24-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-21	E235.Cl	15-Aug-2024	24-Aug-2024	28 days	9 days	✓	24-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-21	E378-U	15-Aug-2024	20-Dec-2024	50 hrs	3044 hrs	× EHT	20-Dec-2024	50 hrs	3047 hrs	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-20	E378-U	15-Aug-2024	20-Dec-2024	53 hrs	3047 hrs	× EHT	20-Dec-2024	53 hrs	3049 hrs	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-20	E235.F	15-Aug-2024	24-Aug-2024	28 days	9 days	✓	24-Aug-2024	28 days	9 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-21	E235.F	15-Aug-2024	24-Aug-2024	28 days	9 days	✓	24-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-20	E235.NO3-L	15-Aug-2024	24-Aug-2024	3 days	9 days	× EHT	24-Aug-2024	3 days	9 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-21	E235.NO3-L	15-Aug-2024	24-Aug-2024	3 days	9 days	× EHT	24-Aug-2024	3 days	9 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-20	E235.NO2-L	15-Aug-2024	24-Aug-2024	3 days	9 days	× EHT	24-Aug-2024	3 days	9 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-21	E235.NO2-L	15-Aug-2024	24-Aug-2024	3 days	9 days	× EHT	24-Aug-2024	3 days	9 days	× EHT
Anions and Nutrients : Sulfate in Water by IC										
HDPE EERI-20	E235.SO4	15-Aug-2024	24-Aug-2024	28 days	9 days	✓	24-Aug-2024	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EERI-21	E235.SO4	15-Aug-2024	24-Aug-2024	28 days	9 days	✓	24-Aug-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) EERI-20	E509	15-Aug-2024	27-Aug-2024	28 days	12 days	✓	27-Aug-2024	28 days	12 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) EERI-21	E509	15-Aug-2024	27-Aug-2024	28 days	12 days	✓	27-Aug-2024	28 days	12 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										
HDPE - dissolved (lab preserved)										
EERI-20	E421	15-Aug-2024	27-Aug-2024	180 days	12 days	✓	28-Aug-2024	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
EERI-21	E421	15-Aug-2024	27-Aug-2024	180 days	12 days	✓	28-Aug-2024	180 days	13 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE										
EERI-20	E353-L	15-Aug-2024	----	----	----		26-Aug-2024	14 days	11 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE										
EERI-21	E353-L	15-Aug-2024	----	----	----		26-Aug-2024	14 days	11 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
EERI-20	E290	15-Aug-2024	24-Aug-2024	14 days	9 days	✓	25-Aug-2024	14 days	10 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
EERI-21	E290	15-Aug-2024	24-Aug-2024	14 days	9 days	✓	25-Aug-2024	14 days	10 days	✓
Physical Tests : Conductivity in Water										
HDPE										
EERI-20	E100	15-Aug-2024	24-Aug-2024	28 days	9 days	✓	25-Aug-2024	28 days	10 days	✓
Physical Tests : Conductivity in Water										
HDPE										
EERI-21	E100	15-Aug-2024	24-Aug-2024	28 days	9 days	✓	25-Aug-2024	28 days	10 days	✓
Physical Tests : pH by Meter										
HDPE										
EERI-21	E108	15-Aug-2024	24-Aug-2024	0.25 hrs	212 hrs	× EHTR-FM	25-Aug-2024	0.25 hrs	240 hrs	× EHTR-FM

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* Rec	*Holding Times* Actual	*Eval*	*Analysis Date*	*Holding Times* Rec	*Holding Times* Actual	*Eval*
Physical Tests : pH by Meter										
HDPE										
EERI-20	E108	15-Aug-2024	24-Aug-2024	0.25 hrs	215 hrs	× EHTR-FM	25-Aug-2024	0.25 hrs	243 hrs	× EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container										
EERI-20	C-13 DIC	15-Aug-2024	----	----	----		16-Dec-2024	----	123 days	
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container										
EERI-21	C-13 DIC	15-Aug-2024	----	----	----		16-Dec-2024	----	123 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container										
EERI-20	H-2+O-18	15-Aug-2024	----	----	----		16-Dec-2024	----	123 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container										
EERI-21	H-2+O-18	15-Aug-2024	----	----	----		16-Dec-2024	----	123 days	

Legend & Qualifier Definitions

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	1614429	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	1614094	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1614432	1	19	5.2	5.0	✓
Conductivity in Water	E100	1614430	1	19	5.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1617369	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1619056	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1617532	1	2	50.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614431	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614434	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614435	1	19	5.2	5.0	✓
pH by Meter	E108	1614428	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1614436	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1614429	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	1614094	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1614432	1	19	5.2	5.0	✓
Conductivity in Water	E100	1614430	1	19	5.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1617369	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1619056	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1617532	1	2	50.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614431	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614434	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614435	1	19	5.2	5.0	✓
pH by Meter	E108	1614428	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1614436	1	19	5.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1614429	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	1614094	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1614432	1	19	5.2	5.0	✓
Conductivity in Water	E100	1614430	1	19	5.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1617369	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1619056	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1617532	1	2	50.0	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*
Method Blanks (MB) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614431	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614434	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614435	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1614436	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1614094	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1614432	1	19	5.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1617369	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1619056	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1617532	1	2	50.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1614431	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1614434	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1614435	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1614436	1	19	5.2	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
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18	Water		See attached report.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1			

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **FJ2402435**	Page	: 1 of 12
Amendment	: **1**		
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 15-Aug-2024 17:30
PO	: ----	Date Analysis Commenced	: 24-Aug-2024
C-O-C number	: ----	Issue Date	: 20-Dec-2024 17:11
Sampler	: ----		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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*
Chamoi Beckford	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1614428)											
FJ2402435-002	EERI-21	pH	----	E108	0.10	pH units	6.81	6.74	1.03%	4%	----
Physical Tests (QC Lot: 1614429)											
FJ2402435-002	EERI-21	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	348	350	0.752%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	348	350	0.752%	20%	----
Physical Tests (QC Lot: 1614430)											
FJ2402435-002	EERI-21	Conductivity	----	E100	2.0	µS/cm	6690	6610	1.20%	10%	----
Anions and Nutrients (QC Lot: 1614094)											
FJ2402435-001	EERI-20	Ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	5.85	5.91	1.06%	20%	----
Anions and Nutrients (QC Lot: 1614431)											
FJ2402473-014	Anonymous	Fluoride	16984-48-8	E235.F	0.200	mg/L	0.474	0.469	0.006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1614432)											
FJ2402473-014	Anonymous	Chloride	16887-00-6	E235.Cl	5.00	mg/L	78.7	78.0	0.835%	20%	----
Anions and Nutrients (QC Lot: 1614434)											
FJ2402473-014	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0500	mg/L	<0.0500	<0.0500	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1614435)											
FJ2402473-014	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1614436)											
FJ2402473-014	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	3.00	mg/L	882	876	0.748%	20%	----
Anions and Nutrients (QC Lot: 1818198)											
FJ2402387-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1617369)											
FJ2402435-001	EERI-20	Carbon, dissolved inorganic [DIC]	----	E353-L	0.50	mg/L	0.81	1.02	0.20	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1617532)											
FJ2402435-001	EERI-20	Aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	0.0066	<0.0050	0.0016	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00050	mg/L	1.22	1.21	1.34%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1617532) - continued											
FJ2402435-001	EERI-20	Bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000250	mg/L	<0.0000250	<0.0000250	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.250	mg/L	695	714	2.60%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000050	mg/L	0.000416	0.000419	0.000003	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00250	mg/L	0.0150	0.0149	0.00014	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00100	mg/L	0.00266	0.00254	0.00013	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000250	mg/L	0.000502	0.000488	0.000014	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.0647	0.0666	2.84%	20%	----
		Magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	0.0343	0.0344	0.0001	Diff <2x LOR	----
		Manganese, dissolved	7439-96-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.00366	0.00396	7.73%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.250	mg/L	7.02	7.08	0.936%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00100	mg/L	0.00871	0.00892	0.00022	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		Silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.250	mg/L	105	104	0.869%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00100	mg/L	6.33	6.42	1.36%	20%	----
		Sulfur, dissolved	7704-34-9	E421	2.50	mg/L	14.7	14.0	0.63	Diff <2x LOR	----
		Tellurium, dissolved	13494-80-9	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0050	mg/L	0.416	0.414	0.425%	20%	----
		Zirconium, dissolved	7440-67-7	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1619056)											
FJ2402398-008	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1614429)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1614430)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Anions and Nutrients (QCLot: 1614094)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1614431)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1614432)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1614434)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1614435)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1614436)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1818198)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 1617369)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1617532)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1617532) - continued						
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1619056)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1614428)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1614429)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.7	85.0	115	----
Physical Tests (QCLot: 1614430)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	101	90.0	110	----
Anions and Nutrients (QCLot: 1614094)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.3	85.0	115	----
Anions and Nutrients (QCLot: 1614431)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1614432)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 1614434)									
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: 1614435)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1614436)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 1818198)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1617369)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 1617532)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	97.8	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	106	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.9	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	97.4	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.7	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	99.7	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1617532) - continued									
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.8	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	96.5	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	96.2	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.5	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	94.9	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	100	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.0	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	94.1	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	97.2	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	96.0	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	106	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.9	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	93.9	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	96.0	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	106	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	98.5	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	99.4	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	102	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	108	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.0	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	100	80.0	120	----
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	95.5	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	99.6	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.2	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.0	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	93.2	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	98.6	80.0	120	----

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: 1614094)										
FJ2402435-002	EERI-21	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1614431)										
FJ2402473-013	Anonymous	Fluoride	16984-48-8	E235.F	10.3 mg/L	10 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1614432)										
FJ2402473-013	Anonymous	Chloride	16887-00-6	E235.Cl	1030 mg/L	1000 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1614434)										
FJ2402473-013	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	25.7 mg/L	25 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1614435)										
FJ2402473-013	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	5.01 mg/L	5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 1614436)										
FJ2402473-013	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1030 mg/L	1000 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1818198)										
FJ2402417-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0319 mg/L	0.03 mg/L	106	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1617369)										
FJ2402435-002	EERI-21	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1617532)										
FJ2402435-002	EERI-21	Aluminum, dissolved	7429-90-5	E421	0.984 mg/L	1 mg/L	98.4	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0973 mg/L	0.1 mg/L	97.3	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.196 mg/L	0.2 mg/L	97.8	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.0458 mg/L	0.05 mg/L	91.6	70.0	130	----
		Boron, dissolved	7440-42-8	E421	ND mg/L	----	ND	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0516 mg/L	0.05 mg/L	103	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.188 mg/L	0.2 mg/L	93.8	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0935 mg/L	0.1 mg/L	93.5	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0881 mg/L	0.1 mg/L	88.1	70.0	130	----
		Iron, dissolved	7439-89-6	E421	ND mg/L	----	ND	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0924 mg/L	0.1 mg/L	92.4	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.456 mg/L	0.5 mg/L	91.2	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND 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
Dissolved Metals (QCLot: 1617532) - continued										
FJ2402435-002	EERI-21	Molybdenum, dissolved	7439-98-7	E421	0.108 mg/L	0.1 mg/L	108	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.182 mg/L	0.2 mg/L	90.9	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	52.3 mg/L	50 mg/L	105	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	ND mg/L	----	ND	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0910 mg/L	0.1 mg/L	91.0	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.210 mg/L	0.2 mg/L	105	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	49.8 mg/L	50 mg/L	99.6	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	----	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.209 mg/L	0.2 mg/L	104	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.0180 mg/L	0.02 mg/L	89.8	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0975 mg/L	0.1 mg/L	97.5	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0994 mg/L	0.1 mg/L	99.4	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.196 mg/L	0.2 mg/L	97.8	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0978 mg/L	0.1 mg/L	97.8	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.0194 mg/L	0.02 mg/L	96.9	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.495 mg/L	0.5 mg/L	98.9	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	1.82 mg/L	2 mg/L	91.2	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
Dissolved Metals (QCLot: 1619056)										
FJ2402408-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000992 mg/L	0 mg/L	99.2	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page ____ of ____

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Project Information

ALS Client Code / QUOTE #:	VA24-WESW100-001
Job / Project #:	24-065-01PG
PO / AFE:	
LSD:	
ALS Lab Work Order # (ALS use only):	

Reports / Recipients

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

Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A

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

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: warren@westernwater.ca

Email 2: avi@westernwater.ca

Email 3: lisa@westernwater.ca

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: amanda@westernwater.ca

Email 2: warren@westernwater.ca

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Contact: Ian Chen Sampler: AB

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

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

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

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Analysis Request

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

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	major and minor cations	~~total recoverable metals~~	dissolved metals+Hg (F)	anions(F, Cl, NO3, HCO3, PO4, SO4) (F)	ammonia	alkalinity	hardness	dissolved inorganic carbon (F)	total dissolved solids	dissolved gases	isotopes	pH	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	FERI-20	15-AUG-24	11:20	GW	9	X		X	X	X	X	X	X	X	X	X	X			
	FERI-21	15-AUG-24	14:00	GW	9	X		X	X	X	X	X	X	X	X	X	X			

Environmental Division
Fort St. John
Work Order Reference
FJ2402435

Telephone : +1 250 261 5517

FJAE Shipping & Receiving
Call Out ___ Expedite
___ Priority
1 # of Coolers ✓ Air
___ # of Carboys ___ Ground

Drinking Water (DW) Samples

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

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

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

dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane), and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
15.5				8			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
	AUG 15/24	17:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	08 15 24	5:30pm

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	Aug 16	9:20pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25007**
Client Project ID:	**FJ2402435**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0057	FJ2402435-001	EERI-20	15-Aug-24	21-Aug-24	Dissolved Gas	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.08				15.69	56.58	
IB-25-0058	FJ2402435-002	EERI-21	15-Aug-24	21-Aug-24	Dissolved Gas	0.006	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	18.55		0.01	<0.01	13.36	68.07	100.0

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25007**
Client Project ID:	**FJ2402435**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes													
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0057	FJ2402435-001	EERI-20					1.46	99.58															
IB-25-0058	FJ2402435-002	EERI-21	0.011				391.13	187.80								-24.6							

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25007**
Client Project ID:	**FJ2402435**

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0057	FJ2402435-001	EERI-20		Modified EPA method RSKSOP-175 used.
IB-25-0058	FJ2402435-002	EERI-21		Headspace present; EPA method RSKSOP-175 not used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25007**
Client File No:	**FJ2402435**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0057	FJ2402435-001	EERI-20	15-Aug-24	21-Aug-24	-22.1	0.05	-175	0.16	-8.4	
IB-25-0058	FJ2402435-002	EERI-21	15-Aug-24	21-Aug-24	-25.1	0.04	-196	0.10	-20.6	

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

CERTIFICATE OF ANALYSIS

Work Order	: **FJ2402590**			
Amendment	: **1**			
Client	: **Western Water Associates Ltd**	Laboratory	:	ALS Environmental - Vancouver
Contact	: Stefanie Schoenberger	Account Manager	:	Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	:	8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	:	+1 604 253 4188
Project	: 24-065-01PG	Date Samples Received	:	28-Aug-2024 07:45
PO	: ----	Date Analysis Commenced	:	29-Aug-2024
C-O-C number	: ----	Issue Date	:	20-Dec-2024 17:25
Sampler	: A B			
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program			
Quote number	: VA24-WESW100-001			
No. of samples received	: 2			
No. of samples analysed	: 2			

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Ghazaleh Khanmirzaei	Analyst	Metals, Burnaby, British Columbia
Kate Dimitrova	Supervisor - Inorganic	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	no units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.

Workorder Comments

Amendment (20/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data. Orthophosphate was added to FJ2402590-1 and -2.

Qualifiers

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EER1-23	EER1-24	----	----	----
					Client sampling date / time	27-Aug-2024 18:10	27-Aug-2024 13:20	----	----	----
						FJ2402590-001	FJ2402590-002	----	----	----
						Result	Result	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		460	<5.0 DLM	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	363	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	1250	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		460	1610	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm		814	5570	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		444	577	----	----	----
pH	----	E108/VA	0.10	pH units		7.62	12.8	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		474	1760	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		0.470	19.8	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		<2.50 DLDS	<25.0 DLDS	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		0.228	<1.00 DLDS	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.0250 DLDS	<0.250 DLDS	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.0255	<0.255	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0050 DLDS	0.0641	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		<0.0010	<0.100	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		13.1	<15.0 DLDS	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		122	20.9	----	----	----
Ion Balance										
Anion sum	----	EC101/VA	0.10	meq/L		9.48	32.2	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EER1-23	EER1-24	----	----	----
					Client sampling date / time	27-Aug-2024 18:10	27-Aug-2024 13:20	----	----	----
						FJ2402590-001	FJ2402590-002	----	----	----
						Result	Result	----	----	----
Ion Balance										
Cation sum	----	EC101/VA	0.10	meq/L		9.74	35.9	----	----	----
Ion balance (cations/anions)	----	EC101/VA	0.010	%		103	111	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%		1.35	5.43	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.0010	0.100	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00010	0.00068	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00181	0.00874	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.171	0.603	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000020	<0.000020	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.078	0.156	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		99.9	231	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		0.000016	0.000073	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	0.00107	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00058	0.00048	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		<0.00020	0.0105	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		0.730	0.017	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	0.00541	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0515	0.0611	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		47.2	0.0222	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EER1-23	EER1-24	----	----	----
					Client sampling date / time	27-Aug-2024 18:10	27-Aug-2024 13:20	----	----	----
						FJ2402590-001	FJ2402590-002	----	----	----
						Result	Result	----	----	----
Dissolved Metals										
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.243	0.00100	----	----	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.00349	0.0160	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		0.00485	0.00636	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.050	<0.050	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		3.35	7.18	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00165	0.00556	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		<0.000050	0.000456	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		6.02	1.30	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		16.5	522	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.440	1.97	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		4.93	4.95	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00020	<0.00020	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	0.00036	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00030	<0.00030	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		0.00148	0.00389	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.000292	<0.000010	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00050	0.00222	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	EER1-23	EER1-24	----	----	----
					Client sampling date / time	27-Aug-2024 18:10	27-Aug-2024 13:20	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402590-001	FJ2402590-002	----	----	----
						Result	Result	----	----	----
Dissolved Metals										
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0177	0.711	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L		<0.00030	<0.00030	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	Field	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	----	----	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	see attached	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	See attached	----	----	----

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

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402590**	Page	: 1 of 11
Amendment	: 1		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Stefanie Schoenberger	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: ----	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 28-Aug-2024 07:45
PO	: ----	Issue Date	: 20-Dec-2024 17:24
C-O-C number	: ----		
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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 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) EER1-23	E298	27-Aug-2024	31-Aug-2024	28 days	4 days	✓	04-Sep-2024	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EER1-24	E298	27-Aug-2024	31-Aug-2024	28 days	4 days	✓	05-Sep-2024	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EER1-23	E235.Cl	27-Aug-2024	30-Aug-2024	28 days	2 days	✓	30-Aug-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EER1-24	E235.Cl	27-Aug-2024	30-Aug-2024	28 days	2 days	✓	30-Aug-2024	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE EER1-23	E378-U	27-Aug-2024	20-Dec-2024	3 days	115 days	× EHT	20-Dec-2024	3 days	115 days	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE EER1-24	E378-U	27-Aug-2024	20-Dec-2024	3 days	115 days	× EHT	20-Dec-2024	3 days	115 days	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE EER1-23	E235.F	27-Aug-2024	30-Aug-2024	28 days	2 days	✓	30-Aug-2024	28 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* Rec	*Holding Times* Actual	*Eval*	*Analysis Date*	*Holding Times* Rec	*Holding Times* Actual	*Eval*
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
EER1-24	E235.F	27-Aug-2024	30-Aug-2024	28 days	2 days	✓	30-Aug-2024	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
EER1-23	E235.NO3-L	27-Aug-2024	30-Aug-2024	3 days	2 days	✓	30-Aug-2024	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
EER1-24	E235.NO3-L	27-Aug-2024	30-Aug-2024	3 days	2 days	✓	30-Aug-2024	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
EER1-23	E235.NO2-L	27-Aug-2024	30-Aug-2024	3 days	2 days	✓	30-Aug-2024	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
EER1-24	E235.NO2-L	27-Aug-2024	30-Aug-2024	3 days	2 days	✓	30-Aug-2024	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
EER1-23	E235.SO4	27-Aug-2024	30-Aug-2024	28 days	2 days	✓	30-Aug-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
EER1-24	E235.SO4	27-Aug-2024	30-Aug-2024	28 days	2 days	✓	30-Aug-2024	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
EER1-23	E509	27-Aug-2024	05-Sep-2024	28 days	9 days	✓	05-Sep-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
EER1-24	E509	27-Aug-2024	05-Sep-2024	28 days	9 days	✓	05-Sep-2024	28 days	9 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										
HDPE - dissolved (lab preserved) EER1-23	E421	27-Aug-2024	30-Aug-2024	180 days	3 days	✓	01-Sep-2024	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EER1-24	E421	27-Aug-2024	30-Aug-2024	180 days	3 days	✓	01-Sep-2024	180 days	5 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EER1-23	E353-L	27-Aug-2024	----	----	----		01-Sep-2024	14 days	5 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EER1-24	E353-L	27-Aug-2024	----	----	----		01-Sep-2024	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EER1-23	E290	27-Aug-2024	30-Aug-2024	14 days	2 days	✓	30-Aug-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EER1-24	E290	27-Aug-2024	30-Aug-2024	14 days	2 days	✓	30-Aug-2024	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE EER1-23	E100	27-Aug-2024	30-Aug-2024	28 days	2 days	✓	30-Aug-2024	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE EER1-24	E100	27-Aug-2024	30-Aug-2024	28 days	2 days	✓	30-Aug-2024	28 days	3 days	✓
Physical Tests : pH by Meter										
HDPE EER1-23	E108	27-Aug-2024	30-Aug-2024	0.25 hrs	54 hrs	× EHTR-FM	30-Aug-2024	0.25 hrs	62 hrs	× EHTR-FM

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* Rec	*Holding Times* Actual	*Eval*	*Analysis Date*	*Holding Times* Rec	*Holding Times* Actual	*Eval*
Physical Tests : pH by Meter										
HDPE										
EER1-24	E108	27-Aug-2024	30-Aug-2024	0.25 hrs	59 hrs	× EHTR-FM	30-Aug-2024	0.25 hrs	67 hrs	× EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container										
EER1-23	C-13 DIC	27-Aug-2024	----	----	----		16-Dec-2024	----	111 days	
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container										
EER1-24	C-13 DIC	27-Aug-2024	----	----	----		16-Dec-2024	----	111 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container										
EER1-23	H-2+O-18	27-Aug-2024	----	----	----		16-Dec-2024	----	111 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container										
EER1-24	H-2+O-18	27-Aug-2024	----	----	----		16-Dec-2024	----	111 days	

Legend & Qualifier Definitions

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	1625050	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1627435	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1625042	1	19	5.2	5.0	✓
Conductivity in Water	E100	1625049	1	20	5.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633829	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1626016	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818199	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	1625045	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1625043	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1625044	1	19	5.2	5.0	✓
pH by Meter	E108	1625048	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1625041	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1625050	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1627435	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1625042	1	19	5.2	5.0	✓
Conductivity in Water	E100	1625049	1	20	5.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633829	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1626016	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818199	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	1625045	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1625043	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1625044	1	19	5.2	5.0	✓
pH by Meter	E108	1625048	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1625041	1	19	5.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1625050	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1627435	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1625042	1	19	5.2	5.0	✓
Conductivity in Water	E100	1625049	1	20	5.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633829	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1626016	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*
Method Blanks (MB) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818199	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	1625045	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1625043	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1625044	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1625041	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1627435	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1625042	1	19	5.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1633829	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1626016	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818199	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	1625045	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1625043	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1625044	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1625041	1	19	5.2	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
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18	Water		See attached report.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1			

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **FJ2402590**	Page	: 1 of 12
Amendment	: **1**		
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Stefanie Schoenberger	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: ----	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 28-Aug-2024 07:45
PO	: ----	Date Analysis Commenced	: 29-Aug-2024
C-O-C number	: ----	Issue Date	: 20-Dec-2024 17:24
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 2		
No. of samples analysed	: 2		

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*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Ghazaleh Khanmirzaei	Analyst	Vancouver Metals, Burnaby, British Columbia
Kate Dimitrova	Supervisor - Inorganic	Vancouver Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1625048)											
KS2403493-001	Anonymous	pH	----	E108	0.10	pH units	8.28	8.28	0.00%	4%	----
Physical Tests (QC Lot: 1625049)											
KS2403493-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	519	522	0.576%	10%	----
Physical Tests (QC Lot: 1625050)											
KS2403493-001	Anonymous	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	235	233	0.691%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	235	233	0.691%	20%	----
Anions and Nutrients (QC Lot: 1625041)											
FJ2402590-001	EER1-23	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	13.1	13.1	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1625042)											
FJ2402590-001	EER1-23	Chloride	16887-00-6	E235.Cl	2.50	mg/L	<2.50	<2.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1625043)											
FJ2402590-001	EER1-23	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1625044)											
FJ2402590-001	EER1-23	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1625045)											
FJ2402590-001	EER1-23	Fluoride	16984-48-8	E235.F	0.100	mg/L	0.228	0.226	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1627435)											
FJ2402590-001	EER1-23	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.470	0.471	0.154%	20%	----
Anions and Nutrients (QC Lot: 1818199)											
FJ2402590-001	EER1-23	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1628803)											
FJ2402570-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	1.50	mg/L	121	122	0.546%	20%	----
Dissolved Metals (QC Lot: 1626016)											
FJ2402583-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0031	0.0032	0.00007	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00010	0.00011	0.000002	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.164	0.166	1.20%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1626016) - continued											
FJ2402583-001	Anonymous	Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.046	0.046	0.0001	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000233	0.0000202	0.0000032	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	37.2	37.0	0.451%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00025	0.00025	0.00000010	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	0.0071	0.0070	0.0001	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	10.0	9.48	5.88%	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	0.000358	0.000356	0.000002	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.427	0.402	0.025	Diff <2x LOR	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00032	0.00028	0.00003	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.00104	0.00113	8.55%	20%	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.96	1.96	0.326%	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	2.70	2.59	4.19%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0762	0.0794	4.13%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	3.23	3.33	0.10	Diff <2x LOR	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000242	0.000250	3.15%	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	<0.0010	<0.0010	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1633829)											
FJ2402590-001	EER1-23	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1625049)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 1625050)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1625041)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1625042)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1625043)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1625044)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1625045)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1627435)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1818199)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 1628803)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1626016)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1626016) - continued						
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1633829)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1625048)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1625049)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	99.0	90.0	110	----
Physical Tests (QCLot: 1625050)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 1625041)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 1625042)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.4	90.0	110	----
Anions and Nutrients (QCLot: 1625043)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	98.9	90.0	110	----
Anions and Nutrients (QCLot: 1625044)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.9	90.0	110	----
Anions and Nutrients (QCLot: 1625045)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.9	90.0	110	----
Anions and Nutrients (QCLot: 1627435)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	99.0	85.0	115	----
Anions and Nutrients (QCLot: 1818199)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	101	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1628803)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	107	80.0	120	----
Dissolved Metals (QCLot: 1626016)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	102	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	96.1	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	105	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.8	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	103	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1626016) - continued									
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.7	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	96.7	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	98.4	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	98.4	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.6	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	103	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	107	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	98.0	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	109	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	99.0	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.5	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	103	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	88.8	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.4	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	95.6	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	98.0	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.1	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	97.6	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.4	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.0	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	98.0	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	100	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	92.2	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	99.9	80.0	120	----

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: 1625041)										
VA24C2393-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	498 mg/L	500 mg/L	99.7	75.0	125	----
Anions and Nutrients (QCLot: 1625042)										
VA24C2393-001	Anonymous	Chloride	16887-00-6	E235.Cl	504 mg/L	500 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1625043)										
VA24C2393-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	12.5 mg/L	12.5 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 1625044)										
VA24C2393-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	2.54 mg/L	2.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1625045)										
VA24C2393-001	Anonymous	Fluoride	16984-48-8	E235.F	5.12 mg/L	5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1627435)										
FJ2402590-002	EER1-24	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1818199)										
FJ2402590-002	EER1-24	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	3.35 mg/L	3 mg/L	112	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1628803)										
FJ2402580-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1626016)										
FJ2402583-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.196 mg/L	0.2 mg/L	98.3	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0181 mg/L	0.02 mg/L	90.4	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0191 mg/L	0.02 mg/L	95.6	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0410 mg/L	0.04 mg/L	102	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00980 mg/L	0.01 mg/L	98.0	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.111 mg/L	0.1 mg/L	111	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00383 mg/L	0.004 mg/L	95.8	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	4.15 mg/L	4 mg/L	104	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00966 mg/L	0.01 mg/L	96.6	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0188 mg/L	0.02 mg/L	93.8	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.93 mg/L	2 mg/L	96.5	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.106 mg/L	0.1 mg/L	106	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	0.987 mg/L	1 mg/L	98.7	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0194 mg/L	0.02 mg/L	97.2	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: 1626016) - continued										
FJ2402583-002	Anonymous	Molybdenum, dissolved	7439-98-7	E421	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	10.2 mg/L	10 mg/L	102	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.96 mg/L	4 mg/L	98.9	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0375 mg/L	0.04 mg/L	93.8	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.69 mg/L	10 mg/L	96.9	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00384 mg/L	0.004 mg/L	96.0	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	1.90 mg/L	2 mg/L	94.9	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	0.0196 mg/L	0.02 mg/L	98.1	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	19.7 mg/L	20 mg/L	98.6	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0386 mg/L	0.04 mg/L	96.5	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00370 mg/L	0.004 mg/L	92.4	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0164 mg/L	0.02 mg/L	82.1	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0188 mg/L	0.02 mg/L	94.1	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0363 mg/L	0.04 mg/L	90.8	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0187 mg/L	0.02 mg/L	93.6	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00386 mg/L	0.004 mg/L	96.4	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0967 mg/L	0.1 mg/L	96.7	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.379 mg/L	0.4 mg/L	94.8	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
Dissolved Metals (QCLot: 1633829)										
FJ2402590-002	EER1-24	Mercury, dissolved	7439-97-6	E509	0.0000794 mg/L	0 mg/L	79.4	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page _ of _

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Fort St. John
Work Order Reference
FJ2402590

Telephone : +1 250 261 5517

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

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

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	amanda@westernwater.ca
Email 2	warren@westernwater.ca

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minir
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge mini
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge mini
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge mini
☐ Same day [E2] if received by 10am M-S - 200% rush surchar
Additional fees may apply to rush requests on weeken
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please co

Project Information		Oil and Gas Required Fields (client use)	
ALS Client Code / QUOTE #:	VA24-WESW100-001	AFE/Cost Center:	PO#
Job / Project #:	24-065-01PG	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact: Ian Chen	Sampler: AB

Analysis Request

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

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	major and minor cations	[redacted]	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	Isotopes	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	FER1-23	27-AUG-24	13:10	GW	9	X		X	X	X	X	X	X	X	X	X			
	FER1-24	27-AUG-24	13:20	GW	9	X		X	X	X	X	X	X	X	X	X			

FJAE Shipping & Receiving
___ Call Out ___ Expedite
___ Priority
1 # of Coolers ✓ Air
___ # of Carboys ___ Ground

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	dissolved gases include CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane), and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
11.5				9			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	Aug 28/24	7:45		Aug 28/24	7:45		Aug 29	10:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page of

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Fort St. John
Work Order Reference
FJ2402590

Telephone : +1 250 261 5517

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax amanda@westernwater.ca
Email 2 warren@westernwater.ca

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge minimum
Additional fees may apply to rush requests on weekends, statutory holidays and non-routine sampling.
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please co...

Project Information

ALS Client Code / QUOTE #: VA24-WESW100-001
Job / Project #: 24-065-01PG
PO / AFE:
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):
ALS Contact: Ian Chen Sampler: AB

Analysis Request

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

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	major and minor cations	[illegible]	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4)	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	Isotopes			SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	EER1-23	27-AUG-24	13:10	GW	9	X		X	X	X	X	X	X	X	X	X					
	EER1-24	27-AUG-24	13:20	GW	9	X		X	X	X	X	X	X	X	X	X					

FJAE Shipping & Receiving
___ Call Out ___ Expedite
___ Priority
1 # of Coolers ✓ Air
___ # of Carboys ___ Ground

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

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

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

dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane), and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
11.5				9			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	AUG 28/24	7:45		AUG 28/24	7:45		AUG 29	1:05

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25025**
Client Project ID:	**FJ2402590**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0170	FJ2402590-001	EERI-23	27-Aug-24	4-Sep-24	Dissolved Gas	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	1.80				4.57	24.07	
IB-25-0171	FJ2402590-002	EERI-24	27-Aug-24	4-Sep-24	Dissolved Gas	0.655	0.006	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.03		0.01	0.01	20.27	79.02	100.0

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25025**
Client Project ID:	**FJ2402590**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes													
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0170	FJ2402590-001	EERI-23	0.003				35.23	44.49								-19.0							
IB-25-0171	FJ2402590-002	EERI-24							-80.7														

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25025**
Client Project ID:	**FJ2402590**

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0170	FJ2402590-001	EERI-23		EPA method RSKSOP-175 used.
IB-25-0171	FJ2402590-002	EERI-24		Headspace present; EPA method RSKSOP-175 not used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25025**
Client File No:	**FJ2402590**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0170	FJ2402590-001	EERI-23	27-Aug-24	4-Sep-24	-22.1	0.03	-171	0.06	-10.5	
IB-25-0171	FJ2402590-002	EERI-24	27-Aug-24	4-Sep-24	-24.0	0.03	-187	0.10	-11.1	

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

CERTIFICATE OF ANALYSIS

Work Order	: **FJ2402561**			
Amendment	: **1**			
Client	: **Western Water Associates Ltd**	Laboratory	:	ALS Environmental - Vancouver
Contact	: Warren Grafton	Account Manager	:	Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	:	8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 541 1030	Telephone	:	+1 604 253 4188
Project	: 24-065-01PG	Date Samples Received	:	23-Aug-2024 16:45
PO	: ----	Date Analysis Commenced	:	27-Aug-2024
C-O-C number	: ----	Issue Date	:	20-Dec-2024 17:20
Sampler	: A B			
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program			
Quote number	: VA24-WESW100-001			
No. of samples received	: 1			
No. of samples analysed	: 1			

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Kate Dimitrova	Supervisor - Inorganic	Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Metals, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	no units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.

Workorder Comments

Amendment (20/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data. Orthophosphate was added to FJ2402561-1.

Qualifiers

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	EERI-25	----	----	----	----
					Client sampling date / time	23-Aug-2024 14:40	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402561-001	----	----	----	----
						Result	----	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		593	----	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	----	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	----	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		593	----	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm		2240	----	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		946	----	----	----	----
pH	----	E108/VA	0.10	pH units		8.06	----	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		1740	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		1.72	----	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		11.0	----	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		0.407	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.100 DLDS	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.102	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0200 DLDS	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		<0.0010	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		794	----	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		165	----	----	----	----
Ion Balance										
Anion sum	----	EC101/VA	0.10	meq/L		28.7	----	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-25	----	----	----	----
					Client sampling date / time	23-Aug-2024 14:40	----	----	----	----
					FJ2402561-001	----	----	----	----	----
					Result	----	----	----	----	----
Ion Balance										
Cation sum	----	EC101/VA	0.10	meq/L		29.4	----	----	----	----
Ion balance (cations/anions)	----	EC101/VA	0.010	%		102	----	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%		1.20	----	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.0014	----	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00010	----	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00343	----	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.00973	----	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000020	----	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	----	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.473	----	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000050	----	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		230	----	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		<0.000010	----	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	----	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00256	----	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		<0.00020	----	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		4.12	----	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	----	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0998	----	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		90.4	----	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-25	----	----	----	----
					Client sampling date / time	23-Aug-2024 14:40	----	----	----	----
					FJ2402561-001	----	----	----	----	----
					Result	----	----	----	----	----
Dissolved Metals										
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L	0.403	----	----	----	----	
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L	<0.0000050	----	----	----	----	
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L	0.000262	----	----	----	----	
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L	0.00177	----	----	----	----	
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L	<0.050	----	----	----	----	
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L	6.61	----	----	----	----	
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L	0.00141	----	----	----	----	
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L	<0.000050	----	----	----	----	
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L	6.33	----	----	----	----	
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L	<0.000010	----	----	----	----	
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L	232	----	----	----	----	
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L	1.20	----	----	----	----	
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L	293	----	----	----	----	
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L	<0.00020	----	----	----	----	
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L	<0.000010	----	----	----	----	
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L	<0.00010	----	----	----	----	
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L	<0.00010	----	----	----	----	
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L	<0.00030	----	----	----	----	
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L	<0.00010	----	----	----	----	
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L	0.00867	----	----	----	----	
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L	<0.00050	----	----	----	----	

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	EERI-25	----	----	----	----
					Client sampling date / time	23-Aug-2024 14:40	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402561-001	----	----	----	----
						Result	----	----	----	----
Dissolved Metals										
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0018	----	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L		<0.00030	----	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	----	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	----	----	----	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	----	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----

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

alsglobal.com

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402561**	Page	: 1 of 10
Amendment	: 1		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 23-Aug-2024 16:45
PO	: ----	Issue Date	: 20-Dec-2024 17:20
C-O-C number	: ----		
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value 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
Method Blank (MB) Values								
Anions and Nutrients	QC-MRG7-1619875 001	----	Sulfate (as SO4)	14808-79-8	E235.SO4	0.46 B mg/L	0.3 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group : Analytical Method / 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) EERI-25	E298	23-Aug-2024	30-Aug-2024	28 days	6 days	✓	30-Aug-2024	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-25	E235.Cl	23-Aug-2024	27-Aug-2024	28 days	4 days	✓	27-Aug-2024	28 days	4 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-25	E378-U	23-Aug-2024	20-Dec-2024	50 hrs	2852 hrs	× EHT	20-Dec-2024	50 hrs	2854 hrs	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-25	E235.F	23-Aug-2024	27-Aug-2024	28 days	4 days	✓	27-Aug-2024	28 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-25	E235.NO3-L	23-Aug-2024	27-Aug-2024	3 days	4 days	× EHT	27-Aug-2024	3 days	4 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-25	E235.NO2-L	23-Aug-2024	27-Aug-2024	3 days	4 days	× EHT	27-Aug-2024	3 days	4 days	× EHT
Anions and Nutrients : Sulfate in Water by IC										
HDPE EERI-25	E235.SO4	23-Aug-2024	27-Aug-2024	28 days	4 days	✓	27-Aug-2024	28 days	4 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* 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 (lab preserved) EERI-25	E509	23-Aug-2024	30-Aug-2024	28 days	7 days	✓	30-Aug-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EERI-25	E421	23-Aug-2024	29-Aug-2024	180 days	6 days	✓	01-Sep-2024	180 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-25	E353-L	23-Aug-2024	----	----	----		29-Aug-2024	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-25	E290	23-Aug-2024	27-Aug-2024	14 days	4 days	✓	28-Aug-2024	14 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-25	E100	23-Aug-2024	27-Aug-2024	28 days	4 days	✓	28-Aug-2024	28 days	5 days	✓
Physical Tests : pH by Meter										
HDPE EERI-25	E108	23-Aug-2024	27-Aug-2024	0.25 hrs	100 hrs	✗ EHTR-FM	28-Aug-2024	0.25 hrs	121 hrs	✗ EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container EERI-25	C-13 DIC	23-Aug-2024	----	----	----		16-Dec-2024	----	115 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Compliant container EERI-25	H-2+O-18	23-Aug-2024	----	----	----		16-Dec-2024	----	115 days	

Legend & Qualifier Definitions

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	1619874	1	12	8.3	5.0	✓
Ammonia by Fluorescence	E298	1625130	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1619876	1	7	14.2	5.0	✓
Conductivity in Water	E100	1619873	1	14	7.1	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1624393	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1627167	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1621970	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1619879	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1619877	1	11	9.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1619878	1	13	7.6	5.0	✓
pH by Meter	E108	1619872	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	1619875	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1619874	1	12	8.3	5.0	✓
Ammonia by Fluorescence	E298	1625130	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1619876	1	7	14.2	5.0	✓
Conductivity in Water	E100	1619873	1	14	7.1	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1624393	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1627167	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1621970	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1619879	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1619877	1	11	9.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1619878	1	13	7.6	5.0	✓
pH by Meter	E108	1619872	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	1619875	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1619874	1	12	8.3	5.0	✓
Ammonia by Fluorescence	E298	1625130	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1619876	1	7	14.2	5.0	✓
Conductivity in Water	E100	1619873	1	14	7.1	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1624393	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1627167	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1621970	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*
Method Blanks (MB) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1619879	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1619877	1	11	9.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1619878	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1619875	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1625130	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	1619876	1	7	14.2	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1624393	1	19	5.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1627167	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1621970	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818198	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	1619879	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1619877	1	11	9.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1619878	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1619875	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18	Water		See attached report.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1			

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **FJ2402561**	Page	: 1 of 12
Amendment	: **1**		
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 23-Aug-2024 16:45
PO	: ----	Date Analysis Commenced	: 27-Aug-2024
C-O-C number	: ----	Issue Date	: 20-Dec-2024 17:20
Sampler	: A B		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Kate Dimitrova	Supervisor - Inorganic	Vancouver Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Maya Urquhart	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1619872)											
FJ2402561-001	EERI-25	pH	----	E108	0.10	pH units	8.06	8.10	0.495%	4%	----
Physical Tests (QC Lot: 1619873)											
FJ2402561-001	EERI-25	Conductivity	----	E100	2.0	µS/cm	2240	2250	0.445%	10%	----
Physical Tests (QC Lot: 1619874)											
FJ2402561-001	EERI-25	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	593	596	0.421%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	593	596	0.421%	20%	----
Anions and Nutrients (QC Lot: 1619875)											
VA24C1824-004	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	13.4	13.4	0.149%	20%	----
Anions and Nutrients (QC Lot: 1619876)											
VA24C1824-004	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1619877)											
VA24C1824-004	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0632	0.0632	0.0902%	20%	----
Anions and Nutrients (QC Lot: 1619878)											
VA24C1824-004	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1619879)											
VA24C1824-004	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.075	0.075	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1625130)											
FJ2402547-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	1.32	1.30	1.84%	20%	----
Anions and Nutrients (QC Lot: 1818198)											
FJ2402387-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1624393)											
FJ2402547-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	5.00	mg/L	590	578	2.02%	20%	----
Dissolved Metals (QC Lot: 1621970)											
FJ2402561-001	EERI-25	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0014	0.0012	0.0002	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00343	0.00394	13.7%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00973	0.0102	5.15%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1621970) - continued											
FJ2402561-001	EERI-25	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	0.473	0.469	0.758%	20%	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	230	229	0.214%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00256	0.00284	10.4%	20%	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	4.12	4.23	2.61%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0998	0.0978	2.06%	20%	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	90.4	99.5	9.54%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.403	0.441	8.95%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000262	0.000258	0.000005	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00177	0.00201	0.00024	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	6.61	7.41	11.4%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00141	0.00160	0.00018	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.33	6.35	0.369%	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	232	258	10.5%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	1.20	1.20	0.574%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	293	291	0.723%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	0.000011	0.0000007	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00867	0.00847	2.32%	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	0.0018	0.0020	0.0002	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1627167)											
FJ2402561-001	EERI-25	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1619873)						
Conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 1619874)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1619875)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	# 0.46	B
Anions and Nutrients (QCLot: 1619876)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1619877)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1619878)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1619879)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1625130)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1818198)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 1624393)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1621970)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1621970) - continued						
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1627167)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1619872)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 1619873)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 1619874)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	97.7	85.0	115	----
Anions and Nutrients (QCLot: 1619875)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 1619876)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 1619877)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1619878)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 1619879)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 1625130)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	94.0	85.0	115	----
Anions and Nutrients (QCLot: 1818198)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1624393)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 1621970)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	99.6	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	98.1	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	105	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	106	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	107	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1621970) - continued									
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.5	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	103	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.8	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.5	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	100	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	99.2	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	103	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	99.3	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.1	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	98.6	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	108	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	99.1	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.8	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	109	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.0	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	105	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	99.6	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	106	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	103	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	97.3	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.6	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.6	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	100	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.7	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	114	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	99.7	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	97.2	80.0	120	----

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: 1619875)										
VA24C1824-004	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 1619876)										
VA24C1824-004	Anonymous	Chloride	16887-00-6	E235.Cl	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 1619877)										
VA24C1824-004	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.49 mg/L	2.5 mg/L	99.4	75.0	125	----
Anions and Nutrients (QCLot: 1619878)										
VA24C1824-004	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.516 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1619879)										
VA24C1824-004	Anonymous	Fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1625130)										
FJ2402561-001	EERI-25	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1818198)										
FJ2402417-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0319 mg/L	0.03 mg/L	106	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1624393)										
FJ2402561-001	EERI-25	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1621970)										
VA24C1484-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00958 mg/L	0.01 mg/L	95.8	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.097 mg/L	0.1 mg/L	97.4	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00393 mg/L	0.004 mg/L	98.4	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.96 mg/L	2 mg/L	97.8	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	----	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	ND 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
Dissolved Metals (QCLot: 1621970) - continued										
VA24C1484-001	Anonymous	Nickel, dissolved	7440-02-0	E421	0.0394 mg/L	0.04 mg/L	98.5	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	11.2 mg/L	10 mg/L	112	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.98 mg/L	4 mg/L	99.6	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0192 mg/L	0.02 mg/L	95.8	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0397 mg/L	0.04 mg/L	99.3	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.63 mg/L	10 mg/L	96.3	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00384 mg/L	0.004 mg/L	96.0	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	----	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00362 mg/L	0.004 mg/L	90.6	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0181 mg/L	0.02 mg/L	90.5	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	0.0389 mg/L	0.04 mg/L	97.2	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	ND mg/L	----	ND	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.392 mg/L	0.4 mg/L	97.9	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
Dissolved Metals (QCLot: 1627167)										
FJ2402563-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000904 mg/L	0 mg/L	90.4	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page of

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-6645/778-675-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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

Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A

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

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax warren@westernwater.ca

Email 2 avi@westernwater.ca

Email 3 lisa@westernwater.ca

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax amanda@westernwater.ca

Email 2 warren@westernwater.ca

Project Information

ALS Client Code / QUOTE #: VA24-WESW100-001

Job / Project #: 24-065-01PG

PO / AFE:

LSD:

ALS Lab Work Order # (ALS use only):

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Contact: Ian Chen Sampler: AB

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

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

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

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Analysis Request

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	major and minor cations	total ~~Mercury~~ Hg	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4)	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	isotopes	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	EERI-25	23-Aug-24	14:40	GW	10	X		X	X	X	X	X	X	X	X	X			

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

Environmental Division
Fort St. John
Work Order Reference
FJ2402561

Telephone : +1 250 261 5517

FJAE Shipping & Receiving
Call Out
Expedite
Priority
# of Coolers ✓
Air
# of Carboys
Ground

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

Are samples taken from a Regulated DW System?

☐ YES ☐ NO

Are samples for human consumption/ use?

☐ YES ☐ NO

Notes / Specify ... lt evaluation by selecting from drop-down below (Excel COC only)

An extra dissolved gal. sample was trying to fill it completely

dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane) and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
18.2				2°C	3.4	1.4	

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
	Aug 23/24	16:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	08 23 24	9:45

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	Aug 26/24	12:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25020**
Client Project ID:	**FJ2402561**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0129	FJ2402561-001	EERI-25	23-Aug-24	29-Aug-24	Dissolved Gas	0.007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	4.36		0.03	0.16	20.77	74.68	100.0

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25020**
Client Project ID:	**FJ2402561**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes													
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0129	FJ2402561-001	EERI-25	0.047				156.56	913.44								-19.0							

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25020**
Client Project ID:	**FJ2402561**

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0129	FJ2402561-001	EERI-25		Headspace present; EPA method RSKSOP-175 not used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25020**
Client File No:	**FJ2402561**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0129	FJ2402561-001	EERI-25	23-Aug-24	29-Aug-24	-22.1	0.02	-172	0.10	-10.8	-10.3

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

CERTIFICATE OF ANALYSIS

Work Order	: **FJ2402599**			
Amendment	: **1**			
Client	: **Western Water Associates Ltd**	Laboratory	:	ALS Environmental - Vancouver
Contact	: Warren Grafton	Account Manager	:	Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George British Columbia Canada V2L 3E8	Address	:	8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 541 1030	Telephone	:	+1 604 253 4188
Project	: 24-065-01PG	Date Samples Received	:	28-Aug-2024 14:21
PO	: ----	Date Analysis Commenced	:	30-Aug-2024
C-O-C number	: ----	Issue Date	:	20-Dec-2024 17:26
Sampler	: Avi			
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program			
Quote number	: VA24-WESW100-001			
No. of samples received	: 1			
No. of samples analysed	: 1			

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	External Subcontracting, Edmonton, Alberta
Kate Dimitrova	Supervisor - Inorganic	Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	no units
%	percent
‰ VPDB	parts per thousand Vienna Pee Dee Belemnite
‰ VSMOW	parts per thousand Vienna Standard Mean Ocean Water
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre

<: 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.

Workorder Comments

Amendment (20/12/2024): This report has been amended and re-released to allow the reporting of additional analytical data. Orthophosphate was added to FJ2402599-1.

Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-28	----	----	----	----
					Client sampling date / time	28-Aug-2024 12:45	----	----	----	----
						FJ2402599-001	----	----	----	----
						Result	----	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L		824	----	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L		56.8	----	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L		<1.0	----	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		880	----	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm		4920	----	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		99.8	----	----	----	----
pH	----	E108/VA	0.10	pH units		8.60	----	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103/VA	1.0	mg/L		3480	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		3.62	----	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		14.5	----	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		<0.400 DLDS	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.100 DLDS	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		<0.102	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0200 DLDS	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		<0.0010	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		1720	----	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L		212	----	----	----	----
Ion Balance										
Anion sum	----	EC101/VA	0.10	meq/L		53.8	----	----	----	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

					Client sample ID	EERI-28	----	----	----	----
					Client sampling date / time	28-Aug-2024 12:45	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402599-001	----	----	----	----
						Result	----	----	----	----
Ion Balance										
Cation sum	----	EC101/VA	0.10	meq/L		53.3	----	----	----	----
Ion balance (cations/anions)	----	EC101/VA	0.010	%		99.1	----	----	----	----
Ion balance (APHA)	----	EC101/VA	0.01	%		-0.47	----	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.0387	----	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00050 DLA	----	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		<0.00050 DLA	----	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.0324	----	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000020	mg/L		<0.000100 DLA	----	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000250 DLA	----	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.948	----	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000250 DLA	----	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		24.3	----	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		0.000069	----	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00250 DLA	----	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		<0.00050 DLA	----	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		<0.00100 DLA	----	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		0.191	----	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000250 DLA	----	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0881	----	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		9.49	----	----	----	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	EERI-28	----	----	----	----
					Client sampling date / time	28-Aug-2024 12:45	----	----	----	----
						FJ2402599-001	----	----	----	----
						Result	----	----	----	----
Dissolved Metals										
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.0342	----	----	----	----
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	----	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.00116	----	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		<0.00250 DLA	----	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		<0.250 DLA	----	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		4.63	----	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00322	----	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		<0.000250 DLA	----	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		3.26	----	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000050 DLA	----	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		1170	----	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.846	----	----	----	----
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		648	----	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00100 DLA	----	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000050 DLA	----	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00050 DLA	----	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00050 DLA	----	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		<0.00150 DLA	----	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		0.00118	----	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		<0.000050 DLA	----	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00250 DLA	----	----	----	----

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	EERI-28	----	----	----	----
					Client sampling date / time	28-Aug-2024 12:45	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		FJ2402599-001	----	----	----	----
						Result	----	----	----	----
Dissolved Metals										
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		0.0053	----	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.00030	mg/L		<0.00100 DLA	----	----	----	----
Dissolved mercury filtration location	----	EP509/VA	-	-		Field	----	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	----	----	----	----
Stable Isotope										
delta-Carbon-13	n/a	C-13 DIC/2D	-	‰ VPDB		see attached	----	----	----	----
delta-Oxygen-18	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----
delta-Hydrogen-2	n/a	H-2+O-18/2D	-	‰ VSMOW		See attached	----	----	----	----

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

alsglobal.com

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **FJ2402599**	Page	: 1 of 9
Amendment	: 1		
Client	: **Western Water Associates Ltd**	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 28-Aug-2024 14:21
PO	: ----	Issue Date	: 20-Dec-2024 17:25
C-O-C number	: ----		
Sampler	: Avi		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 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) EERI-28	E298	28-Aug-2024	02-Sep-2024	28 days	5 days	✓	05-Sep-2024	28 days	8 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE EERI-28	E235.Cl	28-Aug-2024	30-Aug-2024	28 days	2 days	✓	30-Aug-2024	28 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
Compliant container EERI-28	E378-U	28-Aug-2024	20-Dec-2024	52 hrs	2734 hrs	× EHT	20-Dec-2024	52 hrs	2736 hrs	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE EERI-28	E235.F	28-Aug-2024	30-Aug-2024	28 days	2 days	✓	30-Aug-2024	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EERI-28	E235.NO3-L	28-Aug-2024	30-Aug-2024	3 days	2 days	✓	30-Aug-2024	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EERI-28	E235.NO2-L	28-Aug-2024	30-Aug-2024	3 days	2 days	✓	30-Aug-2024	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE EERI-28	E235.SO4	28-Aug-2024	30-Aug-2024	28 days	2 days	✓	30-Aug-2024	28 days	2 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* 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 (lab preserved) EERI-28	E509	28-Aug-2024	07-Sep-2024	28 days	10 days	✓	07-Sep-2024	28 days	10 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EERI-28	E421	28-Aug-2024	05-Sep-2024	180 days	8 days	✓	06-Sep-2024	180 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE EERI-28	E353-L	28-Aug-2024	----	----	----		01-Sep-2024	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE EERI-28	E290	28-Aug-2024	30-Aug-2024	14 days	2 days	✓	31-Aug-2024	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE EERI-28	E100	28-Aug-2024	30-Aug-2024	28 days	2 days	✓	31-Aug-2024	28 days	3 days	✓
Physical Tests : pH by Meter										
HDPE EERI-28	E108	28-Aug-2024	30-Aug-2024	0.25 hrs	51 hrs	× EHTR-FM	31-Aug-2024	0.25 hrs	68 hrs	× EHTR-FM
Stable Isotope : Dissolved Inorganic Carbon in Water by IRMS										
Compliant container EERI-28	C-13 DIC	28-Aug-2024	----	----	----		16-Dec-2024	----	110 days	
Stable Isotope : Stable Isotope Analysis in Water by IRMS										
Amber glass vial EERI-28	H-2+O-18	28-Aug-2024	----	----	----		16-Dec-2024	----	110 days	

Legend & Qualifier Definitions

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	1627007	1	6	16.6	5.0	✓
Ammonia by Fluorescence	E298	1628905	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1626999	1	10	10.0	5.0	✓
Conductivity in Water	E100	1627006	1	13	7.6	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1638077	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1631919	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818199	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	1627002	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1627000	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1627001	1	18	5.5	5.0	✓
pH by Meter	E108	1627005	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1626998	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1627007	1	6	16.6	5.0	✓
Ammonia by Fluorescence	E298	1628905	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1626999	1	10	10.0	5.0	✓
Conductivity in Water	E100	1627006	1	13	7.6	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1638077	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1631919	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818199	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	1627002	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1627000	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1627001	1	18	5.5	5.0	✓
pH by Meter	E108	1627005	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	1626998	1	13	7.6	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1627007	1	6	16.6	5.0	✓
Ammonia by Fluorescence	E298	1628905	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1626999	1	10	10.0	5.0	✓
Conductivity in Water	E100	1627006	1	13	7.6	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1638077	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1631919	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*
Method Blanks (MB) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818199	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	1627002	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1627000	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1627001	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1626998	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1628905	1	12	8.3	5.0	✓
Chloride in Water by IC	E235.Cl	1626999	1	10	10.0	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1628803	1	14	7.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1638077	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1631919	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1818199	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	1627002	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1627000	1	14	7.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1627001	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1626998	1	13	7.6	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
Dissolved Inorganic Carbon in Water by IRMS	C-13 DIC Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1	Water	See attached	See attached report.
Conductivity in Water	E100 ALS Environmental - Vancouver	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 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.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 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 (Low Level)	E235.NO3-L ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 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)
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis 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.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
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 Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	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.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Vancouver	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Vancouver	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Stable Isotope Analysis in Water by IRMS	H-2+O-18	Water		See attached report.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Isobrine Solutions Inc. - 9330 60 Avenue NW Edmonton Alberta Canada T6E 0C1			

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **FJ2402599**	Page	: 1 of 12
Amendment	: **1**		
Client	: Western Water Associates Ltd	Laboratory	: ALS Environmental - Fort St. John
Contact	: Warren Grafton	Account Manager	: Gulraj Dhanaua
Address	: #201-1389 Third Avenue Prince George BC Canada V2L 3E8	Address	: 11007 Alaska Road Fort St. John, British Columbia Canada V1J 6P3
Telephone	: 250 541 1030	Telephone	: +1 250 261 5517
Project	: 24-065-01PG	Date Samples Received	: 28-Aug-2024 14:21
PO	: ----	Date Analysis Commenced	: 30-Aug-2024
C-O-C number	: ----	Issue Date	: 20-Dec-2024 17:25
Sampler	: Avi		
Site	: BC Energy Regulator RFI54525001 - Groundwater Sampling Program RFP		
Quote number	: VA24-WESW100-001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Daniela Ruiz	Account Manager Assistant	Isobrine Solutions Inc. External Subcontracting, Edmonton, Alberta
Kate Dimitrova	Supervisor - Inorganic	Vancouver Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1627005)											
VA24C2440-001	Anonymous	pH	----	E108	0.10	pH units	8.32	8.31	0.120%	4%	----
Physical Tests (QC Lot: 1627006)											
VA24C2440-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	359	356	0.839%	10%	----
Physical Tests (QC Lot: 1627007)											
VA24C2440-001	Anonymous	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	137	136	0.440%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	2.4	2.2	8.70%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	139	138	0.577%	20%	----
Anions and Nutrients (QC Lot: 1626998)											
KS2403514-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	3.00	mg/L	775	780	0.679%	20%	----
Anions and Nutrients (QC Lot: 1626999)											
KS2403514-001	Anonymous	Chloride	16887-00-6	E235.Cl	5.00	mg/L	104	105	1.09%	20%	----
Anions and Nutrients (QC Lot: 1627000)											
KS2403514-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0500	mg/L	0.523	0.542	3.63%	20%	----
Anions and Nutrients (QC Lot: 1627001)											
KS2403514-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1627002)											
KS2403514-001	Anonymous	Fluoride	16984-48-8	E235.F	0.200	mg/L	0.531	0.588	0.057	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1628905)											
FJ2402599-001	EERI-28	Ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	3.62	3.68	1.71%	20%	----
Anions and Nutrients (QC Lot: 1818199)											
FJ2402590-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1628803)											
FJ2402570-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	1.50	mg/L	121	122	0.546%	20%	----
Dissolved Metals (QC Lot: 1631919)											
YL2401346-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	<0.0050	0.0053	0.0003	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00050	mg/L	0.0167	0.0170	1.90%	20%	----
		Arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	1.23	1.21	1.60%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.0826	0.0816	1.22%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1631919) - continued											
YL2401346-001	Anonymous	Bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.050	mg/L	0.302	0.310	0.008	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000250	mg/L	<0.0000250	<0.0000250	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.250	mg/L	858	897	4.36%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000050	mg/L	0.000137	0.000145	0.000008	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	0.00085	0.00081	0.00004	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00100	mg/L	0.00237	0.00218	0.00020	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.050	mg/L	0.057	0.056	0.0008	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.0410	0.0418	0.0008	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	131	129	1.04%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00050	mg/L	0.00501	0.00507	1.21%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.00170	0.00200	0.000299	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00250	mg/L	0.0231	0.0229	0.00020	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.250	mg/L	17.0	17.0	0.292%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00100	mg/L	0.0180	0.0176	2.43%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000250	mg/L	0.000381	0.000294	0.000086	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.250	mg/L	5.43	5.36	1.26%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.250	mg/L	459	456	0.615%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00100	mg/L	11.4	11.5	1.12%	20%	----
		Sulfur, dissolved	7704-34-9	E421	2.50	mg/L	376	378	0.493%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00100	mg/L	<0.00100	0.00107	0.00007	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00050	mg/L	0.00109	0.00107	0.00002	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000050	mg/L	0.000512	0.000507	0.971%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----

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: 1638077)											
FJ2402599-001	EERI-28	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1627006)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 1627007)						
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, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1626998)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1626999)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1627000)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1627001)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1627002)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1628905)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1818199)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 1628803)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 1631919)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1631919) - continued						
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1638077)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

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	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1627005)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1627006)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 1627007)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 1626998)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1626999)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.9	90.0	110	----
Anions and Nutrients (QCLot: 1627000)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1627001)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	97.5	90.0	110	----
Anions and Nutrients (QCLot: 1627002)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	94.5	90.0	110	----
Anions and Nutrients (QCLot: 1628905)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.3	85.0	115	----
Anions and Nutrients (QCLot: 1818199)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	101	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1628803)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	107	80.0	120	----
Dissolved Metals (QCLot: 1631919)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	100	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	105	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.4	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	98.2	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	96.1	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	93.7	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1631919) - continued									
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.8	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	99.1	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.4	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.9	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	94.7	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	94.7	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.3	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.2	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	97.4	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	97.9	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	110	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	94.0	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	103	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	96.1	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	91.4	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	97.4	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.0	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	92.5	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.7	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.6	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	93.5	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	93.2	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.2	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	93.9	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	96.6	80.0	120	----

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: 1626998)										
VA24C2440-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	99.0 mg/L	100 mg/L	99.0	75.0	125	----
Anions and Nutrients (QCLot: 1626999)										
VA24C2440-001	Anonymous	Chloride	16887-00-6	E235.Cl	99.9 mg/L	100 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 1627000)										
VA24C2440-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.51 mg/L	2.5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 1627001)										
VA24C2440-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.476 mg/L	0.5 mg/L	95.2	75.0	125	----
Anions and Nutrients (QCLot: 1627002)										
VA24C2440-001	Anonymous	Fluoride	16984-48-8	E235.F	0.943 mg/L	1 mg/L	94.3	75.0	125	----
Anions and Nutrients (QCLot: 1628905)										
VA24C2052-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0938 mg/L	0.1 mg/L	93.8	75.0	125	----
Anions and Nutrients (QCLot: 1818199)										
FJ2402590-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	3.35 mg/L	3 mg/L	112	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1628803)										
FJ2402580-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 1631919)										
YL2401346-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.969 mg/L	1 mg/L	96.9	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0982 mg/L	0.1 mg/L	98.2	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	ND mg/L	----	ND	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0956 mg/L	0.1 mg/L	95.6	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.203 mg/L	0.2 mg/L	102	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.0466 mg/L	0.05 mg/L	93.2	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.461 mg/L	0.5 mg/L	92.2	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.0191 mg/L	0.02 mg/L	95.6	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0477 mg/L	0.05 mg/L	95.4	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.192 mg/L	0.2 mg/L	96.1	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0933 mg/L	0.1 mg/L	93.3	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0896 mg/L	0.1 mg/L	89.6	70.0	130	----
		Iron, dissolved	7439-89-6	E421	9.56 mg/L	10 mg/L	95.6	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0932 mg/L	0.1 mg/L	93.2	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.480 mg/L	0.5 mg/L	96.0	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0956 mg/L	0.1 mg/L	95.6	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: 1631919) - continued										
YL2401346-002	Anonymous	Molybdenum, dissolved	7439-98-7	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.179 mg/L	0.2 mg/L	89.6	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	54.8 mg/L	50 mg/L	110	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	20.1 mg/L	20 mg/L	100	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0942 mg/L	0.1 mg/L	94.2	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	47.4 mg/L	50 mg/L	94.8	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	----	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.198 mg/L	0.2 mg/L	98.9	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.0181 mg/L	0.02 mg/L	90.5	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0742 mg/L	0.1 mg/L	74.2	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0966 mg/L	0.1 mg/L	96.6	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.193 mg/L	0.2 mg/L	96.6	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0965 mg/L	0.1 mg/L	96.5	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.496 mg/L	0.5 mg/L	99.2	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	1.92 mg/L	2 mg/L	95.9	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.191 mg/L	0.2 mg/L	95.6	70.0	130	----
Dissolved Metals (QCLot: 1638077)										
FJ2402607-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000967 mg/L	0 mg/L	96.7	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page ___ of

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Western Water Associates Ltd.
Contact:	Warren Grafton/Lisa Gardiner
Phone:	250-614-8645/778-875-3978
	Company address below will appear on the final report
Street:	201-1389 3rd Avenue
City/Province:	Prince George, BC
Postal Code:	V2L 3E8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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

Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A

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

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: warren@westernwater.ca

Email 2: avi@westernwater.ca

Email 3: lisa@westernwater.ca

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: amanda@westernwater.ca

Email 2: warren@westernwater.ca

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

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

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

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Client Code / QUOTE #: VA24-WESW100-001

Job / Project #: 24-065-01PG

PO / AFE:

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):

ALS Contact: Ian Chen Sampler: AB

Analysis Request

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

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	major and minor cations	[illegible]	dissolved metals+Hg	anions(F, Cl, NO3, HCO3, PO4, SO4)	ammonia	alkalinity	hardness	dissolved inorganic carbon	total dissolved solids	dissolved gases	Isotopes				SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	EFR1-28	28-AUG-24	12:45	GW	9	X		X	X	X	X	X	X	X	X	X						

FJAE Shipping & Receiving

___ Call Out ___ Expedite

___ Priority

1 # of Coolers ✓ Air

___ # of Carboys ___ Ground

Environmental Division
Fort St. John
Work Order Reference
FJ2402599

Telephone : +1 250 261 551 /

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

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

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

Notes / Specify Limits for result evalua... (Excel COC only)

dissolved gases include:CH4,C2H6,C3H8,He,O2,N2,CO2; Isotopes include: δ18O and δ2H of water, δ13C and δ2H of methane and δ13C of CO2 (on samples with sufficient concentrations of methane), and δ13C of DIC

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
5.8				3			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	AUG 28/24	14:15		08/28/24	2:20	YG	28/8/24	12:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 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.

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25025**
Client Project ID:	**FJ2402599**

						Free Gas/Headspace														
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**Date Collected**	**Date Received**	**Sample Type**	**C_1**	**C_2**	**C_3**	**iC_4**	**nC_4**	**$neoC_5$**	**iC_5**	**nC_5**	**nC_6**	**nC_7**	**CO_2**	**CO**	**He**	**H_2**	**Ar + O_2**	**N_2**	**Total**
						% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
IB-25-0169	FJ2402599-001	EERI-28	28-Aug-24	4-Sep-24	Dissolved Gas	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.48		<0.01	<0.01	20.80	78.72	100.0

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25025**
Client Project ID:	**FJ2402599**

GAS ANALYSIS RESULTS

			Dissolved Gas						Carbon and Hydrogen Isotopes												
Isobrine ID	**Client sample ID**	**Client sample ID 2**	**C1**	**C2**	**C3**	**iC4**	**CO2**	**N2**	**$\delta^{13}C_{C1}$**	**$\delta^{13}C_{C2}$**	**$\delta^{13}C_{C3}$**	**$\delta^{13}C_{iC4}$**	**$\delta^{13}C_{nC4}$**	**$\delta^{13}C_{iC5}$**	**$\delta^{13}C_{nC5}$**	**$\delta^{13}C_{CO2}$**	**$\delta^{2}H_{C1}$**	**$\delta^{2}H_{C2}$**	**$\delta^{2}H_{C3}$**	**$\delta^{2}H_{iC4}$**	**$\delta^{2}H_{nC4}$**	**$\delta^{2}H_{iC5}$**	**$\delta^{2}H_{nC5}$**
			ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VPDB**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**	**‰ VSMOW**
IB-25-0169	FJ2402599-001	EERI-28														-15.4							

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25025**
Client Project ID:	**FJ2402599**

9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com

Isobrine ID	Client sample ID	Client sample ID 2	δ^2H_{H2}	Comments
			‰ VSMOW	
IB-25-0169	FJ2402599-001	EERI-28		Headspace present; EPA method RSKSOP-175 not used.

Not Analyzed
Below detection Limit
Not Applicable

Client:	**ALS Environmental**
Report date:	**December 12, 2024**
Isobrine File No:	**ISOBR-25025**
Client File No:	**FJ2402599**

WATER ANALYSIS RESULTS

ISOBRINE solutions
9330 60 Avenue NW
Edmonton, AB
Canada, T6E 0C1
www.isobrine.com
780-433-3699

Isobrine ID	Client sample ID	Client sample ID 2	Collected	Received	$\delta^{18}O$		$\delta^{2}H$		$\delta^{13}C$ - DIC	
					‰ VSMOW	±1σ	‰ VSMOW	±1σ	Result	Repeat
IB-25-0169	FJ2402599-001	EERI-28	28-Aug-24	4-Sep-24	-23.1	0.03	-181	0.34	-7.1	

$\delta^{18}O$ & $\delta^{2}H$ (CRDS)

Instrument Used: Model L2130-i Cavity Ring Down Spectrometer (CRDS), from Picarro Inc, California, USA
Reported in units of per mil (‰) relative to the international reference standard, Vienna Standard Mean Ocean Water (VSMOW).
Typical Standard deviation: (18O) ± 0.1 ‰; (2H) ± 1 ‰

$\delta^{13}C$ - Dissolved Inorganic Carbon (DIC)

Instrument Used: DeltaPlus XL Isotope Ratio Mass Spectrometer (IRMS) - Finnigan MAT, Germany.
Reported in units of per mil (‰) relative to the international reference standard, Vienna Peedee Belemnite (PDB).
deviation: ± 0.2 ‰

western water
ASSOCIATES LTD

Groundwater Supply Development and Management

Source Water Assessment and Protection

Well Monitoring & Maintenance

Environmental & Water Quality Monitoring

Storm & Wastewater Disposal to Ground

Groundwater Modeling

Aquifer Test Design and Analysis

Geothermal / Geoexchange Systems

Policy and Guideline Development

Applied Research

Rural Subdivision Services

Environmental Assessment & Permitting

| #201 – 1968 Queensway Street, Prince George, BC V2L 1M2 | P:1.250.614.6645 | Vernon | Victoria | www.westernwater.ca |