Enos Lake Water Quality Monitoring Program

2022 Annual Report

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Executive Summary

From February to November 2022, the British Columbia Conservation Foundation (BCCF) conducted water quality sampling in Enos Lake based on a monitoring schedule and sampling procedures outlined in the *Enos Lake Protection and Monitoring Program* (ELPMP). Data collection was completed by BCCF staff, with assistance from three community volunteers interested in the conservation and protection of the lake and its ecosystem.

In 2022, the ELPMP recommended adhering to the 5-year monitoring plan through an expanded protocol to include additional assessment of metals, hardness, PAHs in lake sediment, and *E. coli*. Water quality samples were collected five times in thirty days in February, once in May, five times in August, and once in November. This expanded sampling protocol was intended to allow for the examination of annual trends, a review of the monitoring program, and feedback for ongoing sustainable watershed management.

Results were sent to a professional limnologist for analysis and review. Results indicated that both chlorophyll-*a* and Total Phosphorous increased relative to 2019, 2020, and 2021, but were on par with results from 2017 and 2018. There have been no exceedances above the target value for chlorophyll-*a* since 2017. The majority (62.5%) of Total Phosphorous samples exceeded the target value of 12 µg/L in May, August, and November 2022; as a result, the annual average was also above target for 2022. Total Iron exceeded chronic and acute targets at depth in August 2022, and Dissolved Copper may also have exceeded targets. Dissolved oxygen results met the target for the epilimnion (≥5 mg/L) in all months, but did not meet the target for the hypolimnion (≥2 mg/L) in May or August 2022. This also occurred from 2017 – 2021, and is considered a natural condition of Enos Lake. However, the severity of oxygen depletion in the hypolimnion has increased since 2017 and, concerningly, was noted to extend up into the thermocline in August of 2021 and 2022. The progression of hypoxia beyond the hypolimnion should be closely monitored, as late summer wind-induced mixing could result in fish die-offs which would threaten the red-listed Enos Lake stickleback species-pair in Enos Lake.

Per the recommendations of the ELPMP, water quality monitoring should continue annually until at least one-year post-build-out within the Enos Lake watershed, following the template provided in the ELPMP. Suggestions for data accuracy and improvement include continuing with a QA/QC program to increase confidence in field data collection methods and lab analysis (e.g. duplicate and field blank samples, YSI readings on ascent and descent of probes) and additional Secchi readings throughout the year. Additional parameters, such as Dissolved Organic Carbon in water and % organic carbon in sediment, should be collected in tandem with samples for metals and sediment PAHs in future.

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Background

An annual water quality monitoring program for Enos Lake was established in 2017 by the British Columbia Conservation Foundation (BCCF), per the management recommendations of the *Enos Lake Protection and Monitoring Plan* (ELPMP) (PGL 2016).

This report summarizes the monitoring of select chemical and physical water quality parameters to evaluate the seasonal water quality and productivity status of Enos Lake in 2022, for comparison with established water quality targets. A summary of five-year data trends was completed. This report also includes suggestions for reporting as outlined in the ELPMP, including:

- A summary of work performed (including dates, individuals, weather conditions, methods, QA/QC protocols, and any challenges encountered during the work).
- A presentation of the water quality results compared against targets in the ELPMP.
- A summary of preventative actions taken with respect to aquatic invasive species in the past year (e.g. signage, educational materials for residents or visitors, etc.).
- Any anecdotal observations related to Enos Lake ecology, including but not limited to aquatic invasive species.
- An interpretation of the results of the program for the past year, conducted by an experienced, qualified limnologist, provided in report form, including but not limited to input provided for stormwater management practices or new phases of construction (included as an appendix).
- Recommendations for augmentation to the program, if relevant.
- Laboratory certificates and raw data for the year, as appendices.

1.0 Introduction

Enos Lake is a small, relatively productive lake located on Vancouver Island's Nanoose peninsula (Fig. 1). The lake is approximately 18 ha and surrounded by nearby ponds and wetlands, supporting a wide diversity of birds and aquatic life. The lake is approximately 12 metres at its deepest point, and drains into Enos Creek via a weir established in 1956 at its north outlet (PGL 2016).

Enos Lake is most well-known for the presence of a unique benthic and limnetic stickleback species-pair, protected under the federal Species at Risk Act (SARA). The pair were designated as Threatened in 1988, then re-classified and split into two species, each listed as Endangered in 2002 and renewed in 2012 (Environment Canada 2011). Recent research has suggested the species pair is collapsing due to habitat changes caused by crayfish and/or changes in lake productivity (Taylor et al. 2006; Taylor & Piercey 2018).

Enos Lake undergoes thermal stratification in the summer months, resulting in a very warm surface water layer (epilimnion); this layer is separated from the cooler, deeper water (hypolimnion) by a narrow zone of rapid temperature change (thermocline). Solar radiation and wind movement at the water's surface work together to warm the uppermost layer. In contrast, the water at depth receives very little sunlight and remains cool and dark. Density differences prevent these two layers from mixing during the summer months.

From fall through early spring, as air temperatures drop and the amount of solar radiation decreases, the warm surface waters gradually cool and densify. Denser water settles down into the hypolimnion and initiates mixing throughout the entire water column, a process known as fall turnover. While Enos Lake occasionally receives thin ice cover during winter cold snaps, it typically does not freeze for extended periods of time.

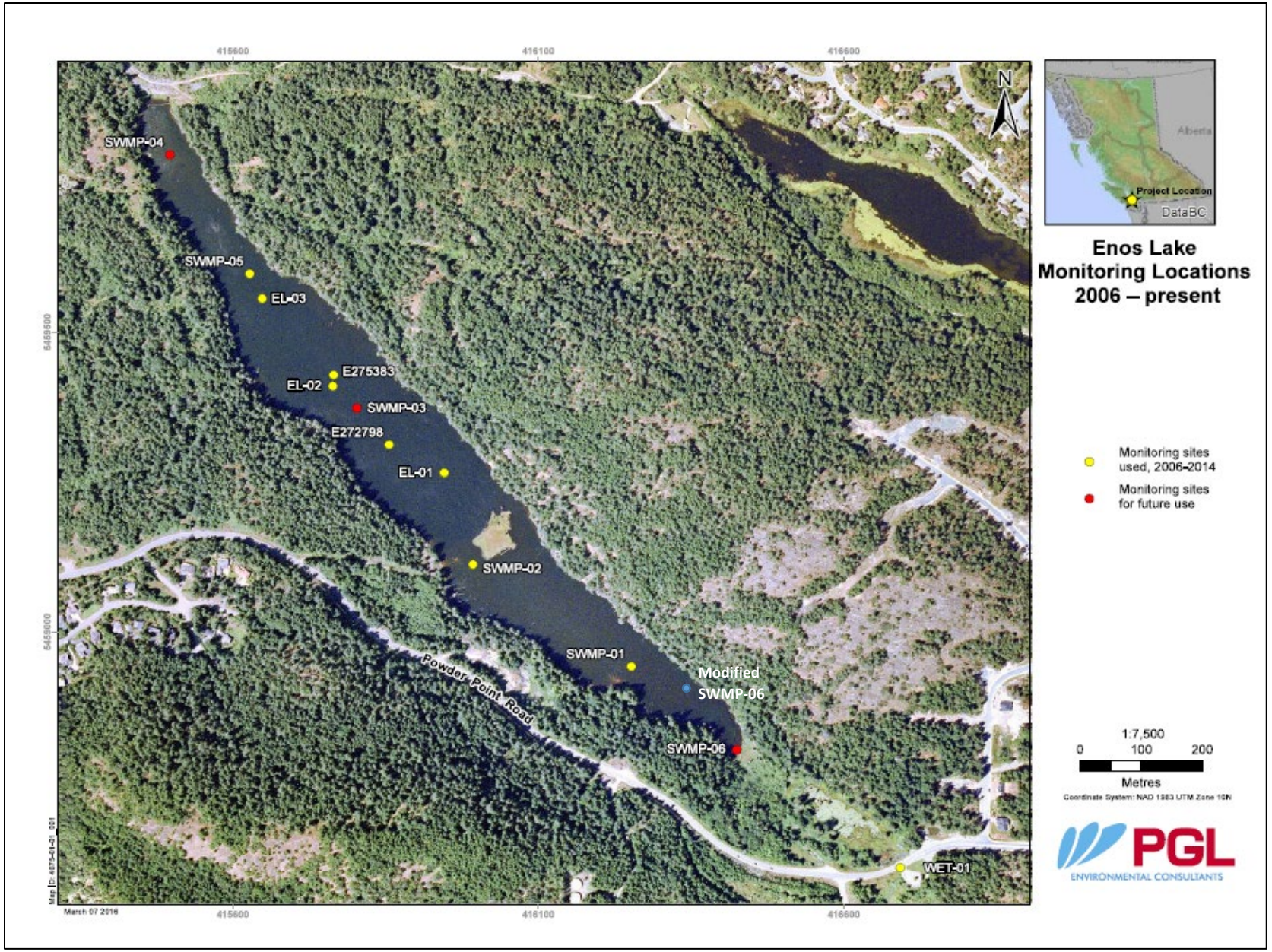

Figure 1: Enos Lake sampling locations (PGL 2016).

2.0 Methods

2.1 Scope of Work

BCCF was contracted to conduct water quality sampling as described in the ELPMP (Table 1) in 2022. Sampling occurred quarterly and field crews consisted of one BCCF biologist with an additional volunteer or field technician. Water samples were collected from three depths at site SWMP-03 (Fig. 1), located at the deepest part of the lake. Sediment and surface *E. coli* water samples were also collected from site SWMP-04 and Modified SWMP-06 (Fig. 1). These sites were accessed by boat with a small electric motor; regular site SWMP-06 was not accessible in 2022 due to shallow water and submerged hazards.

Table 1: Proposed ELPMP Monitoring Schedule for 2022 (PGL 2016).

	2022											
Parameter	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Dissolved Oxygen		F			F			F			F	
Temperature		F			F			F			F	
Redox potential		F			F			F			F	
pH		F			F			F			F	
Secchi Depth		F			F			F			F	
Chlorophyl *a*		L			L			L			L	
Phosphorhus		L			L			L			L	
E Coli								E				
Metals		M						M				
Hardness		M						M				
PAH								P				
Legend	***L = Water sample from three depths at SWMP-03***											
	F = 1m in situ profiles from SWMP-03											
	E = Five samples in 30 days, from SWMP-03 and any two shoreline locations.											
	M = Five samples in 30 days, from SWMP-03											
	P = Surface sediment from SWMP-03, SWMP-06 and SWMP-04											

2.2 Data Collection

FIELD EQUIPMENT

The following equipment was utilized for field sampling:

- YSI Professional Plus QUATTRO handheld multi-parameter water quality sonde with probes for Galvanic Dissolved Oxygen, Temperature/Conductivity, pH, and ORP (with calibration solutions)
- 1 L Van Dorn water sampler
- Ekman sediment sampler, loaned from the Ministry of Environment (Nanaimo BC)
- Sample bottles, supplied by ALS Laboratories (Burnaby, BC)
- Chain of Custody (COC) forms, supplied by ALS Laboratories
- Cooler with ice, shipping labels and packing tape
- Secchi disk
- Field notebook
- Safety kit (First Aid, waders, gloves, Personal Flotation Devices (PFDs))
- 10-ft Zodiac with an electric outboard motor, anchor and oars

IN SITU FIELD PARAMETERS

In situ water quality parameters were collected once per quarter, beginning in February at site SWMP-03. The YSI handheld sonde probes measuring Dissolved Oxygen, pH, Specific Conductivity and ORP were calibrated by a BCCF technician immediately prior to each sampling date, and calibration records kept for reference. Probes were replaced if calibration results indicated deviation from standard Good Laboratory Practice (GLP) values. Results were recorded at 1 m intervals throughout the water column, down to approximately 10-12 m (total site depth). An occasional reading was taken every 0.5 m in the thermocline during cases of a steep temperature transition. Parameters measured included:

- Temperature (°C)
- Dissolved oxygen (mg/L and %)
- pH
- Specific Conductivity (µS/cm)
- Redox potential (mV)

Weather and surface observations were noted, and a water clarity measurement was recorded using a Secchi disk between 10 am – 4 pm.

LABORATORY SAMPLES

Water samples were collected once per quarter, beginning in February at site SWMP-03 at 1, 5, and 10 m depths using a 1 L Van Dorn sampler. Samples were collected for chlorophyll-*a* (unfiltered), orthophosphate (raw water) and total phosphorous (preserved H_2SO_4) analyses.

Additional samples for Hardness, TSS, and Total Metals, including Mercury (unfiltered) analyses, were collected from similar depths five times in thirty days in February and August from SWMP-03. Surface samples for *E. coli* were collected five times in thirty days in August from SWMP-03, SWMP-04 and Modified SWMP-06. One duplicate sample was collected for each parameter (except *E. coli*) on each sampling date; the depth of the duplicate sample was determined randomly in advance using a number generator app.

Water sampling procedures followed guidelines provided by ALS Laboratoriess, those outlined in the *Ambient Freshwater and Effluent Sampling Manual* (BC Ministry of Water, Land and Air Protection 2003) and those provided in the ELPMP (PGL 2016). Sample bottles were pre-labelled and handled carefully to prevent contamination of the interior cap or bottle. The Van Dorn was rinsed before each sampling event, and allowed to remain at the desired sampling depth for 10 seconds before retrieving samples to ensure mixing within the sampling tube. Water samples were carefully transferred to the bottles provided from ALS, packed in a cooler with ice and completed COC form. Samples were immediately shipped to the ALS lab in Burnaby for analysis by ground courier.

Lake sediment samples were collected in mid-August for analysis of polycyclic aromatic hydrocarbons (PAHs) from SWMP-03, near shore at SWMP-04 and near shore at Modified SWMP-06. The Ekman sampler was allowed to settle gently on the sediment before triggering, and a retrieved sample was transferred to the amber glass sample jars as intact as possible. At sites SWMP-04 and Modified SWMP-06, sediment samples had to be retrieved from closer to shore after five attempts were made at each site using the Ekman sampler; organic litter and debris prevented successful deployment of the Ekman sampler at both locations.

ADDITIONAL MONITORING

In 2022, the Friends of Enos Lake also undertook additional monitoring as part of a Level 1 lake monitoring program. This included twelve approximately weekly water clarity (Secchi depth) measurements and depth profiles (Temperature-DO) at site SWMP-03 from June 22 to September 29. This monitoring was managed by the BC Lake Stewardship Society; more information about sampling methods can be found at: https://www.bclss.org/programs#bclsmp-monitoring-levels

INVASIVE SPECIES & WILDLIFE

Incidental monitoring for invasive species occurred concurrently with water sampling, through visual observation and assessment of emergent/shallow submerged vegetation seen while travelling to the sample site and any plant matter attached to the boat anchor. Incidental wildlife observations were also noted.

HISTORICAL AIR TEMPERATURE AND PRECIPITATION

Data were retrieved from Environment Canada's historical weather database for the Qualicum Beach Airport weather station (Meteorological Service of Canada - Climate ID 1026562), for the period of January 1, 2016 to December 20, 2022. The weather station is located approximately 20 km from the Nanoose peninsula. Data were summarized by daily maximum, mean, and minimum values.

2.3 Analysis

ALS Laboratories (Burnaby, BC) performed all sample analyses including Quality Assurance/Quality Control (QA/QC) for assessment methods. Results were received by BCCF two to three weeks after sample submission (Appendix 1).

All results were sent to professional limnologist John Deniseger for further review and comparison to water quality guidelines and historical data for Enos Lake. Deniseger's analysis is summarized in "*Enos Lake Protection and Monitoring Program: Review of Water Quality Data for 5 Year Period from 2017 to 2022*" (Appendix 2); highlights of Deniseger's findings and some additional figures are presented here. Data were compiled using MS Excel and summarized using descriptive analyses.

3.0 Results

Water quality targets as listed in the ELPMP are summarized in Table 2. Each parameter is discussed in detail in Deniseger (2022) (Appendix 2). Summaries of the BC Water Quality Guidelines for relevant lab parameters are also included in Deniseger (2022).

Table 2: Summary of Water Quality Monitoring Targets for data collected in 2022 (PGL 2016).

Parameter (units)		Water Quality Target
***In situ* parameters**	Secchi depth (m)	None - supporting context only
	Dissolved Oxygen (mg/L)	≥5 mg/L epilimnion ≥2 mg/L hypolimnion
	Conductivity (µS/cm)	None - supporting context only
	Temperature (°C)	None - supporting context only
	pH	None - supporting context only
	Redox (mV)	None - supporting context only
Lab result	Total phosphorous (µg/L or mg/L)	≤12 µg/L
	Chlorophyll-a (µg/L)	Avoid any increase [1]
	Metals (various)	BC Water Quality Guidelines – Total Metals[2], Freshwater Aquatic Life (both chronic & acute, where applicable)
	PAHs (µg/mg or mg/kg)	BC Water Quality Guidelines – Freshwater Sediments
	E. coli (#/mL)	BC Water Quality Guidelines – Recreation (Secondary contact)[3]

[1] – Chlorophyll-*a* baseline data for Enos Lake (2009-2013) ranges from 0.17 to 19.8 µg/L; values typically in the range of 4-5 µg/L (PGL 2016).

[2] – Certain metals (e.g. Copper, Aluminum) have guidelines for Dissolved Metals, which are not addressed through sampling for Total Metals.

[3] – Secondary contact guidelines not available so Primary Contact guidelines used.

3.1 Air temperature and precipitation

Mean daily air temperature and precipitation data are summarized in Figure 2. A comparison of the mean monthly air temperature and precipitation for the summer period (June – September) is provided in Table 3.

Air temperatures in June and July of 2022 did not deviate far from temperatures observed in past years. However, mean monthly air temperatures in August and September of 2022 were the highest on record since 2016 (Table 3).

While July of 2022 had the highest mean monthly precipitation on record since 2016, both August and September had extremely low mean monthly precipitation relative to past years (Table 3). This indicates it was a cool and damp spring that extended well into July, and a very dry late summer that extended well past the typical dry season.

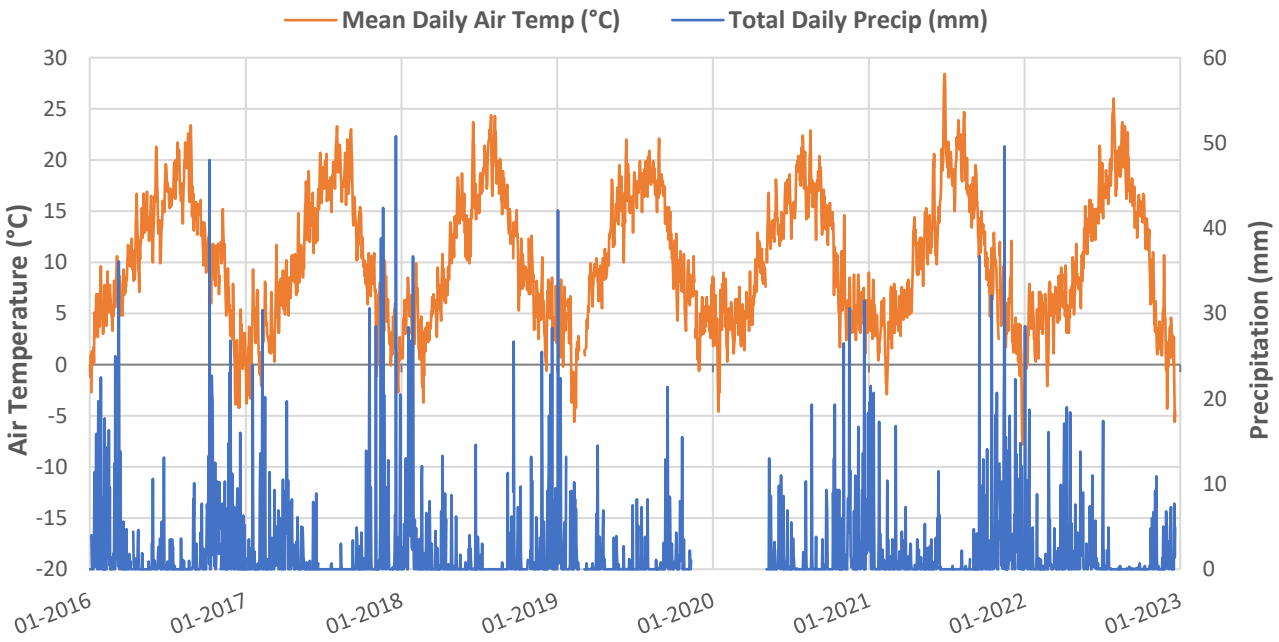

Figure 2: Mean daily air temperature and precipitation for the Qualicum Beach Airport, 2016-2022 (Environment Canada 2022).

Table 3: Mean monthly air temperature and precipitation for the Qualicum Beach Airport, Jun-Sep 2016-2022 (Environment Canada 2022).

xx	Warmest mean monthly air temperature (since 2016)

	Mean monthly precip < 0.5 mm

	Mean monthly precip 0.5 ≤ 1.0 mm

	Mean monthly precip > 1.0 mm

JUNE							
	2016	2017	2018	2019	2020	2021	2022
Air temp (°C)	15.8	15.3	15.2	16.1	14.9	17.8	15.1
Precipitation (mm)	1.2	0.6	1.2	0.4	1.8	1.3	1.3

JULY							
	2016	2017	2018	2019	2020	2021	2022
Air temp (°C)	17.9	18.0	19.3	17.8	17.6	19.8	19.0
Precipitation (mm)	0.5	0.0	0.2	0.9	0.5	0.0	1.1

AUGUST							
	2016	2017	2018	2019	2020	2021	2022
Air temp (°C)	18.7	19.2	18.8	18.4	17.1	18.9	20.1
Precipitation (mm)	0.5	0.1	0.0	0.3	1.2	0.2	0.0

SEPTEMBER							
	2016	2017	2018	2019	2020	2021	2022
Air temp (°C)	13.6	15.5	14.0	14.6	15.9	14.4	16.0
Precipitation (mm)	1.5	0.7	3.0	2.5	1.0	3.5	0.1

3.2 In situ Field Parameters

A summary of highlights from field monitoring is provided below. Each parameter is discussed in detail in Deniseger (2022) (Appendix 2).

WATER CLARITY

Water clarity is evaluated using Secchi depth. In 2022, Secchi depth ranged between a minimum of 1.3 m on February 1 to a high of 3.6 m on July 12. This pattern is consistent with a phytoplankton bloom in February, which appears to also be a frequent occurrence for Enos Lake in previous years. The average annual Secchi depth since 2017 is approximately 2.7 m (Fig. 3).

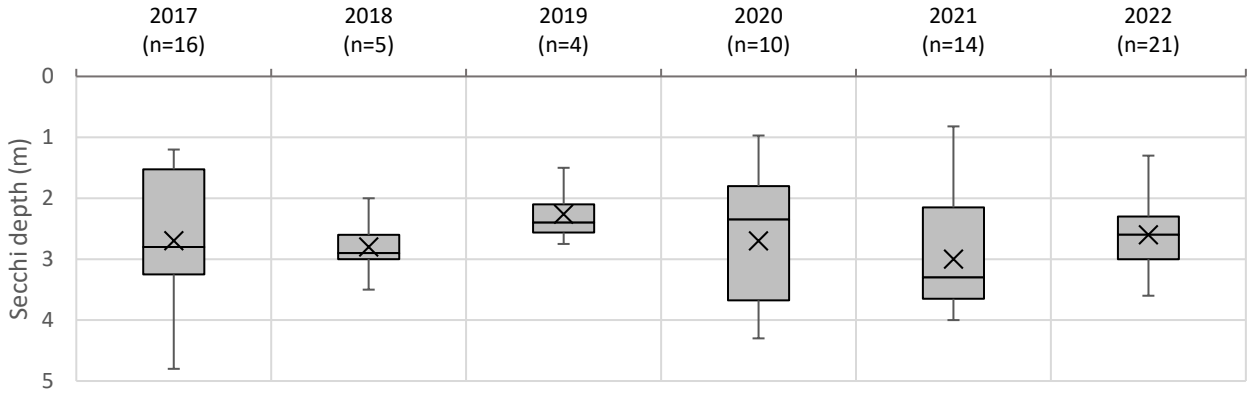

Figure 3: Annual Secchi depth values, 2017-2022. X represents mean while horizontal bar represents median.

TEMPERATURE

In 2022, water temperature varied with the season. The lake was relatively isothermal (between 4-7°C) in both February and November; however, strong thermal stratification was exhibited in May and August. The thermocline showed signs of degradation in early October. However, thermal stratification likely persisted later than usual in 2022 due to the warm and dry fall season. The maximum water temperature recorded by BCCF was 23.9°C, measured at the surface (0.5 m) on August 15, 2022 at 11:00 am (Fig. 4). The Friends of Enos Lake conducted additional weekly depth profiles during August and observed a maximum surface temperature of 25.1°C on August 3, 2022 at 2:00 pm.

While the epilimnion ranges from 12-20°C and 20-24°C in May and August, repectively, the hypolimnion always remains below 10°C (Fig. 5). Patterns of thermocline[4] development are relatively consistent, with the greatest annual variation seen for spring surface temperatures (Fig. 6).

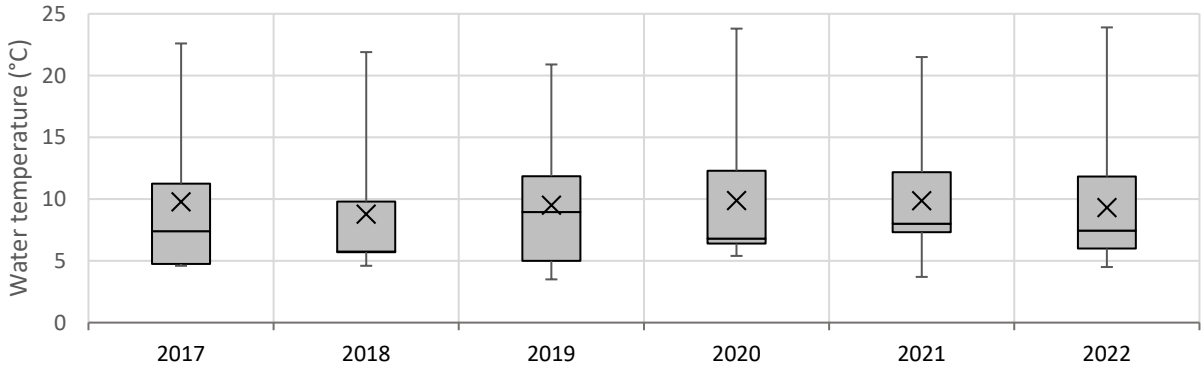

Figure 4: Mean annual water temperature values (n=4 samples per year), 2017-2022.

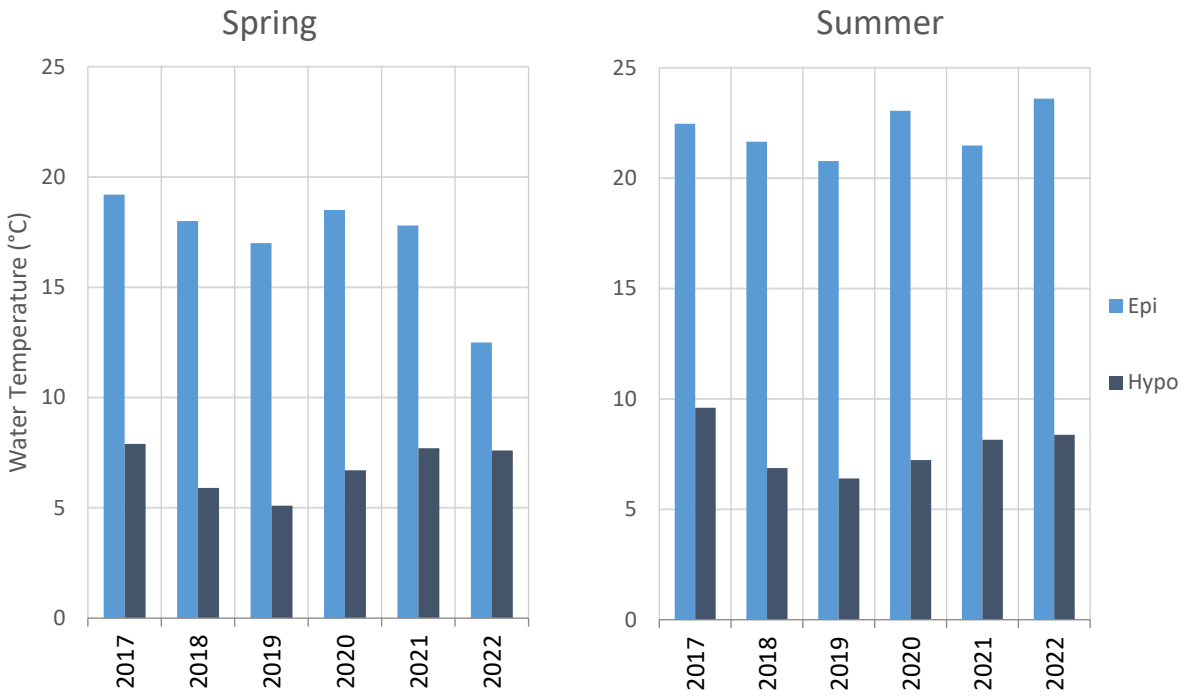

Figure 5: Stratified layer mean water temperatures for Enos Lake, 2017-2022. The light blue bar on the left is the epilimnion, while the dark blue bar on the right is the hypolimnion.

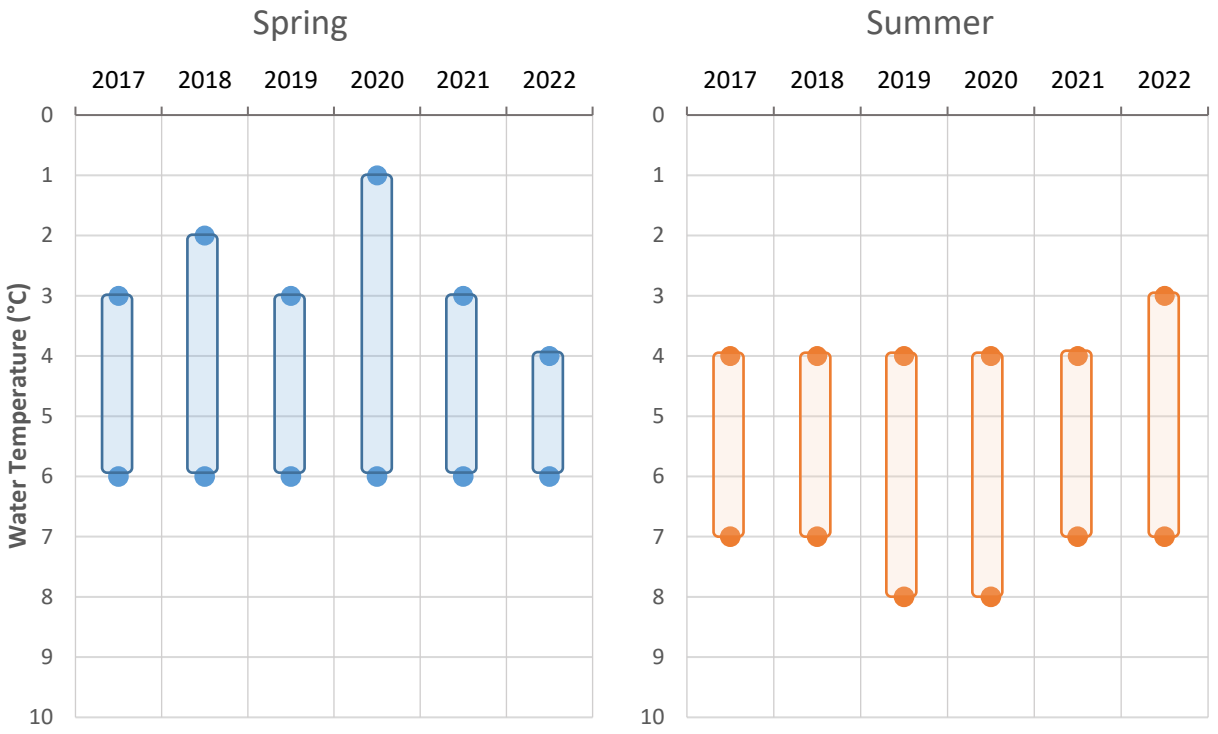

Figure 6: Measured thermocline depths for Enos Lake, 2017-2022.

[4] – The thermocline is defined as the zone where water temperature changes ≥ 1°C with every meter of lake depth

DISSOLVED OXYGEN

In 2022, the dissolved oxygen (DO) water quality target (≥ 5 mg/L for the epilimnion) was met throughout the year; however, the DO target for the hypolimnion (≥ 2 mg/L) was not met from summer through fall. Despite the cool, wet spring condtions, the DO was already severely depleted at depth as of mid-May 2022. Severely anoxic conditions developed below the thermocline by mid-August and eventually expanding upwards to a depth of 6 m by mid-September.

The epilimnion has not dropped below the DO target since sampling began in 2017; however, the hypolimnion is consistently below target in summer. This is mentioned in the ELPMP, which noted the DO concentrations are "often below 1.0 mg/L" and that this is a natural existing condition of the lake (PGL 2016) and is due to the decomposition of organic matter (Deniseger 2022).

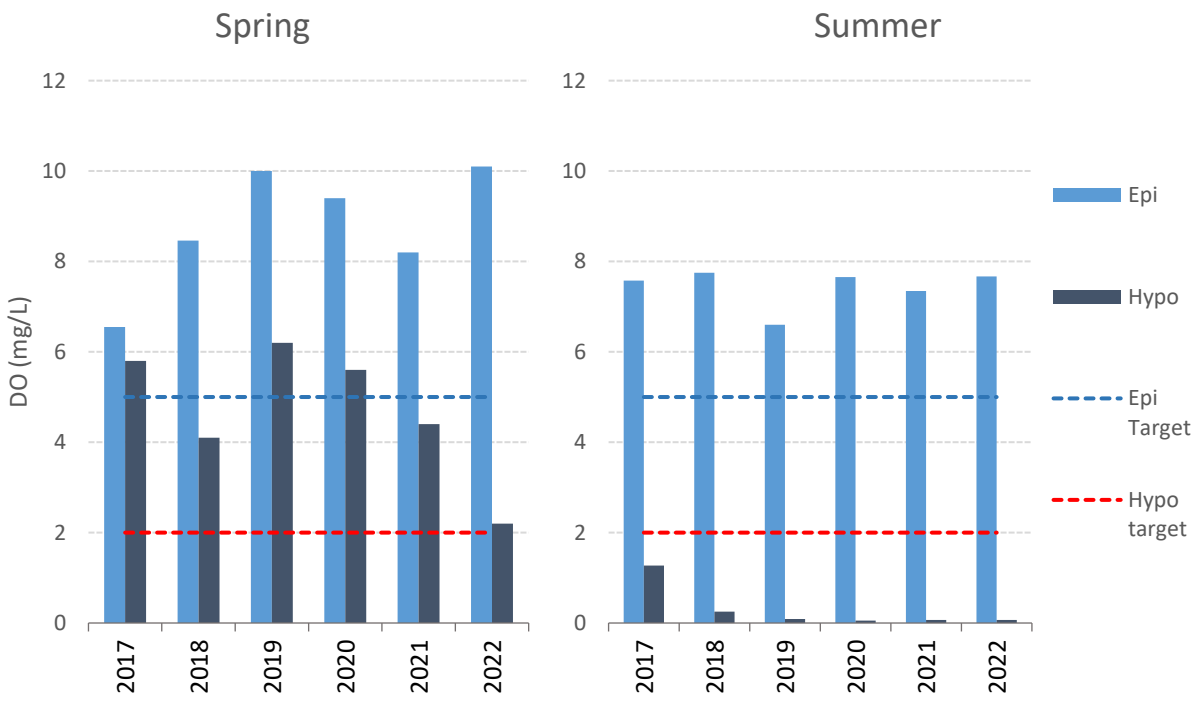

Figure 7: Stratified layer mean dissolved oxygen concentrations for Enos Lake, 2017-2022. The light blue bar on the left is the epilimnion, while the dark blue bar on the right is the hypolimnion. The light blue dashed line the DO target for the epilimnion, while the red dashed line is the DO target for the hypolimnion.

3.3 Laboratory Samples

An overview of sample results is provided in Table 4 and all laboratory results are in Appendix 1. Each parameter is discussed in detail in Deniseger (2022) in Appendix 2. Additional figures are provided in Appendix 3.

PHOSPHOROUS

In 2022, the mean annual Total Phosphorous (Total P) was 14.4 µg/L (*SD* = 6.75), which is above the water quality target of 12 µg/L. The target threshold was exceeded by individual samples on eight occasions from May to November of 2022 (Table 4).

In 2021 and 2019, the mean annual Total P was below target at 10.68 µg/L (*SD* = 4.27) and 7.3 µg/L (*SD* = 5.0), respectively. In 2020, 2018, and 2017, the averages were at or above target at 12.0 µg/L (*SD* = 2.5), 16.6 µg/L (*SD* = 10.6), and 20.4 µg/L (*SD* = 11.1), respectively (Fig. 8).

Orthophosphate was relatively undetectable in 2022, with values below the laboratory Reporting Detection Limit (RDL) of 1 µg/L for almost all samples. An incorrect analysis method was requested in May 2022 (Total Dissolved Phosphorous (TDP) instead of Dissolved Orthophosphate), thus, results were removed from analysis. Note, all TDP results from May 2022 were also above the Total Phosphorous target of 12.0 µg /L (Appendix 1).

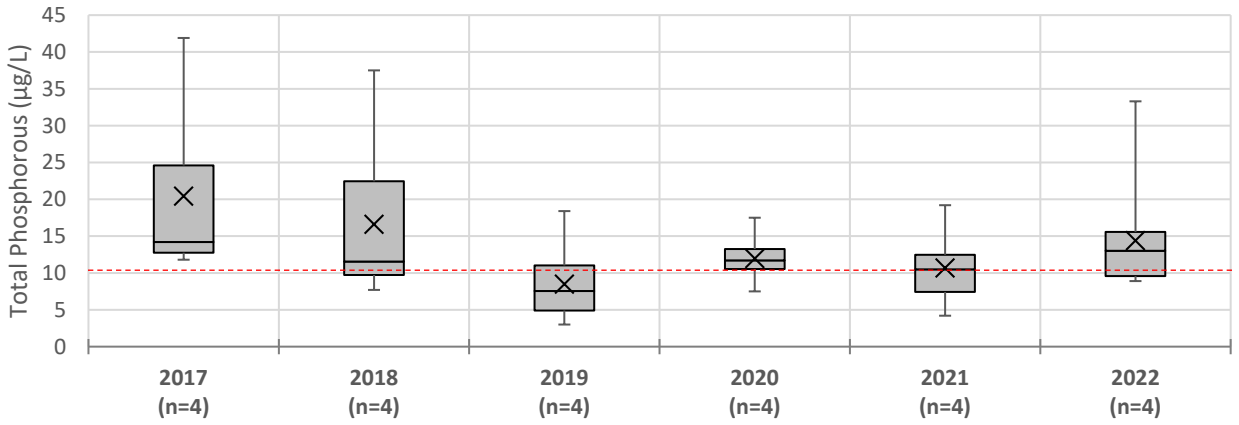

Figure 8: Mean annual Total Phosphorous values, 2017-2022; red line is threshold target (12 µg/L).

CHLOROPHYLL-A

In 2021, chlorophyll-*a* concentrations were below the upper limit of 19.8 µg/L as specified in the ELPMP (Table 2). The maximum chlorophyll-*a* concentration was 16.6 µg/L, collected on November 21, 2022 at 1 m depth (Table 4).

The mean annual chlorophyll-*a* concentration across all depths and dates in 2022 was 10.7 µg/L (*SD* = 3.4). This is similar to results from 2020, 2018, and 2017 (Fig. 9). Note the lab destroyed the intact sample due to a communication error in February 2019; thus, there are no results for this month. This likely skews the result for 2019 (Fig. 9).

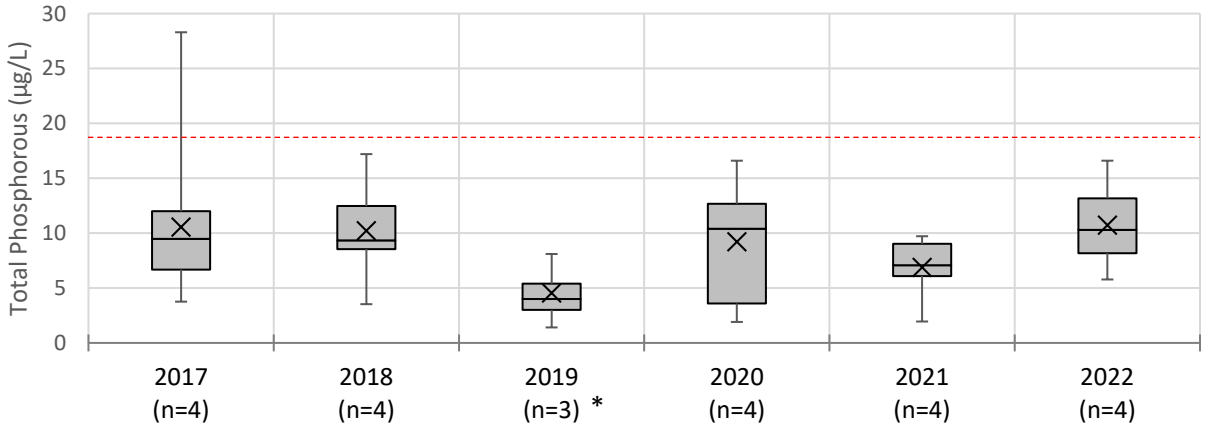

Figure 9: Mean annual Chlorophyll-a results for Enos Lake , 2017-2022.

E. COLI

Escherichia coli are a type of bacteria found in the environment. The number of *E. coli* per 100 mL is used to evaluate water quality for recreational use. In 2022, *E. coli* was sampled five times in thirty days from August 2 – 28. In 2017, sampling occurred five times in thirty days from August 24 – September 13. In both years, samples were collected from the surface at three different sites (Fig. 1).

The ELPMP notes that Secondary Contact guidelines should be used. No such guidelines are currently listed on the BC Water Quality Guideline webpage (https://bcgov-env.shinyapps.io/bc_wqg/). The main recreational use of the lake is non-motorized paddling, although even this is limited due to the inaccessible shoreline and lack of boat launch. Dogs are frequent swimmers in the lake due to the proximity of walking trails. BCCF observed one human swimmer for the first time in the summer of 2022. This suggests that Primary Contact guidelines could apply. The Primary Contact guidelines for recreational use are:

- ≤ 200 E. coli /100 mL; geometric mean concentration (minimum of 5 samples*) or,
- ≤ 400 E. coli /100 mL; single sample maximum concentration

Sample results in both sample years are well below the primary contact guidelines for *E. coli* (Fig. 10).

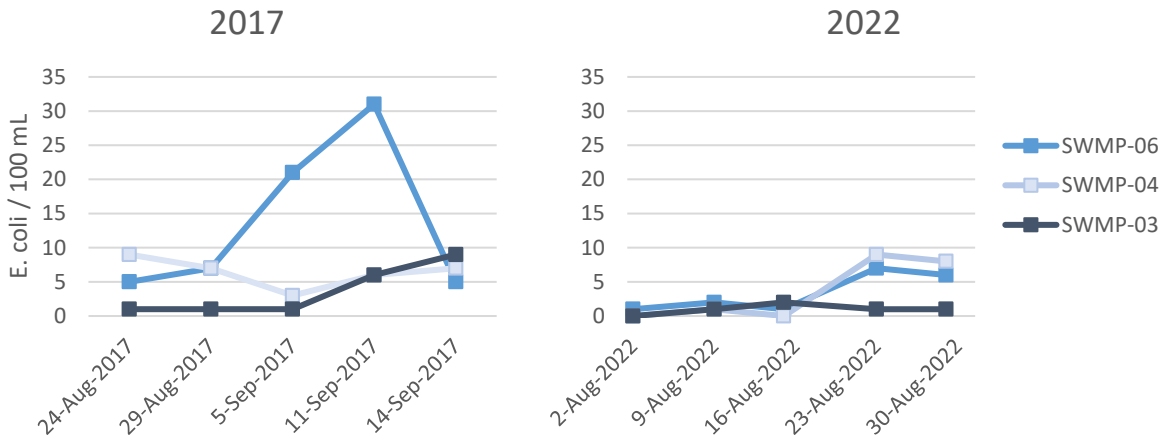

Figure 10: *E. coli* results for Enos Lake, 2017 & 2022.

METALS

The BC Water Quality Guidelines are largely based on Total Metals concentrations, although some Dissolved Metals concentrations apply (see Appendix 2, Table 5.1). Dissolved Metals were sampled in 2017, while Total Metals were sampled in 2022 (Table 5). In 2022, results were generally well within the BC guidelines for aquatic life at all depths, although some samples required further interpretation (Deniseger 2022):

Aluminum

In 2017, Dissolved Aluminum (Al) was well below the guidelines in all samples. In February 2022, Total Al exceeded the guideline for Dissolved Al (chronic maximum). However, data from 2017 showed that Dissolved Al was 39–49% of Total Al; under a similar assumption, Dissolved Al would likely have met the guideline. For more details, please see Appendix 2.

Copper

The guideline for Dissolved Copper (Cu) requires dissolved organic carbon (DOC) data for interpretation. An approximate chronic guideline of 0.4 µg/L and an approximate acute guideline of 2.3 µg/L Dissolved Cu was established by Deniseger (2022). Using the estimated guidelines, the Dissolved Cu concentrations exceeded the chronic guideline in 2017 while Total Cu exceeded both the chronic and acute guidelines for Dissolved Cu in 2022. Similar to the procedure for Aluminum, a comparison of data from 2017 suggests Dissolved Cu makes up a lower proportion of Total Cu. Interpretation remains limited without DOC and Dissolved Cu data (Deniseger 2022).

Manganese & Iron

Manganese (Mn) and Iron (Fe) both follow a similar pattern driven by internal loading due to anoxic conditions at depth (Deniseger 2022). Mn met both the chronic and acute guidelines in 2017 and 2022, but Fe exceeded guidelines at depth in August 2017 and in August 2022.

Zinc

Depending on interpretation, Dissolved Zinc (Zn) either met or just slightly exceeded the Total Zn chronic guideline in March 2017. More details are available in Deniseger (2022). Total Zn met both the chronic and acute guidelines in 2022.

PAHs

Interpretation of PAH data is limited as there is no organic carbon data available to calculate the appropriate sediment criteria for Enos Lake. Using an estimated 1.0% organic carbon content, both Benzo(a)pyrene and phenanthrene appear to exceed sediment guidelines in August 2022 (Table 6). Both also appeared to increase relative to 2017. However, if organic carbon content exceeds approximately 5%, it is unlikely these values exceed guidelines. Historical sampling showed a relatively consistent mean Total Organic Carbon (TOC) concentration of 5.9 mg/L in water; however, no data about TOC in sediment is available.

3.4 Invasive Species & Wildlife Observations

No invasive species were noted during field sampling in 2022. River otters (at least one adult and two juveniles) were noted for the first time by BCCF in Enos Lake in 2022. Scat around the lake has been observed for years, but this is the first time the otters have been observed swimming near the watercraft. The otters appear to have taken up residence in the lake, as they were observed on every sampling date from February through November 2022. Several scat piles containing what appear to be crustacean (crayfish) shells are visible around the lake.

Mergansers and buffleheads have been observed, and at least eighteen bald eagles were observed bathing and resting near the lake in mid-February 2022. Several groups of eagles formed at the north and south ends of the lake. Despite the visible presence of nests and the occasional sighting, such a high number of eagles had not been observed before by BCCF (Figure 12). Finally, for the first time ever, BCCF staff observed a stickleback swimming near the watercraft (very close to the water's surface) on August 23, 2022.

Figure 11: River otter swims in Enos Lake, February 15, 2022. Photo by Danny Swainson.

Figure 12: Eagles gathering and bathing in Enos Lake, February 15, 2022. Photos by Danny Swainson.

Table 4: Summary of Laboratory Results (excluding metals and sediment) from Enos Lake 2022 Water Quality Monitoring.

		Date	Feb 15, 2022				May 16, 2022				Aug 15, 2022				Nov 21, 2022			
		Site	SWMP-03				SWMP-03				SWMP-03				SWMP-03			
	Units	RDL [5]	1 m	5 m	10 m	Duplicate 1 m	1 m	5 m	10 m	Duplicate 10 m	1 m	5 m	10 m	Duplicate 5 m	1 m	5 m	10 m	Duplicate 10 m
Plant pigments																		
Chlorophyll-*a*	µg/L	0.50	8.86	7.10	8.15	8.26	8.18	15.2	11.6	11.6	5.78	10.0	10.4	10.4	16.6	14.0	12.9	12.4
Anions & Nutrients																		
Orthophosphate-Dissolved (as P)	mg/L	0.0010	0.0011	<0.001	0.0013	-	-	-	-	-	<0.001	0.0012	<0.001	0.0011	<0.001	<0.001	<0.001	<0.001
Total dissolved phosphorous[6]	mg/L	0.0020	-	-	-	-	0.0117	0.0136	0.0167	0.0182	-	-	-	-	-	-	-	-
Total Phosphorus (P)	mg/L	0.0020	0.0097	0.0089	0.0092	-	**0.0150[7]**	**0.0134[7]**	**0.0168[7]**	**0.0178[7]**	0.0091	**0.0180[7]**	**0.0333[7]**	**0.0188[7]**	**0.0141[7]**	0.0117	**0.0126[7]**	**0.0133[7]**
Physical tests																		
Hardness (as CaCO3), from total Ca/Mg	mg/L	0.60	44.0	44.0	45.9	-	-	-	-	-	48.6	45.4	46.8	46.0	-	-	-	-
Total Suspended Solids (TSS)	mg/L	3.0	-	<3.0	-	-	-	-	-	-	<3.0	3.2	4.0	<3.0	-	-	-	-
Turbidity	NTU	0.10	-	1.25	-	-	-	-	-	-	1.11	1.20	3.08	1.26	-	-	-	-
Microbiological tests																		
E. coli	#/100mL	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-

[5] – RDL = Reportable Detection Limit

[6] – Incorrect analysis requested; Total Dissolved Phosphorous by Colourimetry reported (not Dissolved Orthophosphate by Colourimetry)

[7] – Total phosphorous values exceeding the water quality target of ≤12 µg/L

Table 5: Summary of Metals results from Enos Lake 2022 Water Quality Monitoring.

Enos Lake Metals/Nutrients/Anions 1st quarter - FEBRUARY 2022 (5 times in 30 days)			Sampling Date Report Date C.O.C. Job # Lab	1-Feb-2022 11-Feb-2022 20-986009 VA22A2093 ALS			Sampling Date Report Date C.O.C. Job # Lab	8-Feb-2022 18-Feb-2022 20-986002 VA22A2563 ALS		
Biotic, Anions & Nutrients	Units	RDL	**SWMP03-1M**	**SWMP03-1M duplicate**	**SWMP03-5M**	**SWMP03-10M**	**SWMP03-1M**	**SWMP03-5M**	**SWMP03-5M duplicate**	**SWMP03-10M**
Chlorophyll a	ug/L	0.5	-	-	-	-	-	-	-	-
Orthophosphate (P)	mg/L	0.001	-	-	-	-	-	-	-	-
Total Phosphorus (P)	mg/L	0.002	-	-	-	-	-	-	-	-
Total Coliforms			-	-	-	-	-	-	-	-
E. coli	CFU/100mL	1	-	-	-	-	-	-	-	-
Physical & Inorganics	Units	RDL	**SWMP03-1M**	**SWMP03-1M duplicate**	**SWMP03-5M**	**SWMP03-10M**	**SWMP03-1M**	**SWMP03-5M**	**SWMP03-5M duplicate**	**SWMP03-10M**
Total Hardness (CaCO3)	mg/L	0.5	42.2	42.8	42.0	42.0	41.1	41.5	41.8	41.7
Dissolved Hardness	mg/L	0.5	-	-	-	-	-	-	-	-
Turbidity			-	-	1.5	-	-	-	1.4	-
TSS			-	-	<3.0	-	-	-	<3.0	-
pH			6.5	6.5	6.6	6.6	6.6	6.7	6.7	6.7
Total Metals by ICPMS	Units	RDL	**SWMP03-1M**	**SWMP03-1M duplicate**	**SWMP03-5M**	**SWMP03-10M**	**SWMP03-1M**	**SWMP03-5M**	**SWMP03-5M duplicate**	**SWMP03-10M**
Total Aluminum (Al)	ug/L	3	67.2	55.7	83	83.1	58	61.7	58.1	64.2
Total Antimony (Sb)	ug/L	0.1	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Arsenic (As)	ug/L	0.1	0.17	0.18	0.17	0.18	0.18	0.18	0.17	0.18
Total Barium (Ba)	ug/L	0.1	14.9	15.1	15.1	15.5	14.5	14.5	14.4	14.4
Total Beryllium (Be)	ug/L	0.1	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Bismuth (Bi)	ug/L	0.05	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Boron (B)	ug/L	10	19	19	19	19	18	19	19	19
Total Cadmium (Cd)	ug/L	0.005	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Cesium	ug/L	0.01	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Chromium (Cr)	ug/L	0.5	< RDL	< RDL	1.34	< RDL	< RDL	< RDL	< RDL	< RDL
Total Cobalt (Co)	ug/L	0.1	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Copper (Cu)	ug/L	0.5	1.72	1.52	1.44	1.35	1.54	1.58	1.45	1.34
Total Iron (Fe)	ug/L	10	162	154	167	163	132	141	139	144
Total Lead (Pb)	ug/L	0.05	0.21	0.367	0.194	0.155	0.981	0.43	0.234	0.097
Total Lithium (Li)	ug/L	1	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Manganese (Mn)	ug/L	0.1	27.2	27	27.6	27.4	24.8	25.7	25.6	26.3
Total Mercury (Hg)	ug/L	0.005	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Molybdenum (Mo)	ug/L	0.05	0.174	0.218	0.172	0.167	0.176	0.174	0.19	0.172
Total Nickel (Ni)	ug/L	0.5	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Rubidium	ug/L	0.2	0.42	0.41	0.39	0.44	0.36	0.41	0.4	0.38
Total Selenium (Se)	ug/L	0.05	0.111	0.12	0.066	0.079	0.111	< RDL	0.087	0.086
Total Silicon (Si)	ug/L	100	3610	3560	3680	3670	3400	3440	3440	3490
Total Silver (Ag)	ug/L	0.01	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Strontium (Sr)	ug/L	0.2	43.7	42.4	43.4	44.9	41.6	42.3	42.1	40.8
Total Tellurium	ug/L	0.2	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Thallium (Tl)	ug/L	0.01	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Thorium	ug/L	0.1	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Tin (Sn)	ug/L	0.1	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Titanium (Ti)	ug/L	0.3	2.24	1.65	3.5	3.54	2.04	2.3	2.17	2.37
Total Tungsten	ug/L	0.1	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Uranium (U)	ug/L	0.01	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
Total Vanadium (V)	ug/L	0.5	0.96	0.87	0.86	0.85	0.5	0.52	0.51	< RDL
Total Zinc (Zn)	ug/L	3	3	3.7	< RDL	< RDL	5.5	4.2	< RDL	< RDL
Total Zirconium (Zr)	ug/L	0.2	< RDL	< RDL	< RDL	0.21	< RDL	< RDL	< RDL	< RDL
Total Calcium (Ca)	mg/L	0.05	14.4	14.7	14.3	14.3	14	14.1	14.2	14.2
Total Magnesium (Mg)	mg/L	0.005	1.51	1.49	1.52	1.53	1.49	1.54	1.53	1.52
Total Potassium (K)	mg/L	0.05	0.31	0.301	0.305	0.307	0.29	0.297	0.299	0.296
Total Sodium (Na)	mg/L	0.05	7.09	6.99	6.99	7.09	6.74	6.87	6.8	6.82
Total Sulphur (S)	mg/L	0.5	1.96	2.02	1.75	1.88	1.5	1.59	1.65	1.69

RDL = Reportable Detection Limit

Sampling Date	15-Feb-2022					Sampling Date	22-Feb-2022			Sampling Date	28-Feb-2022		
Report Date	28-Feb-2022					Report Date	9-Mar-2022			Report Date	10-Mar-2022		
C.O.C.	20-986008					C.O.C.	20-986007			C.O.C.	20-986006		
Job #	VA22A3162					Job #	VA22A3571			Job #	VA22A4191		
Lab	ALS					Lab	ALS			Lab	ALS		
SWMP03-1M	SWMP03-1M duplicate	SWMP03-5M	SWMP03-5M duplicate	SWMP03-10M	SWMP03-10M duplicate	SWMP03-1M	SWMP03-1M duplicate	SWMP03-5M	SWMP03-10M	SWMP03-1M	SWMP03-5M	SWMP03-5M duplicate	SWMP03-10M
8.9	8.3	7.1	-	8.2	-	-	-	-	-	-	-		-
0.0011	-	<0.001	<0.001	0.0013	-	-	-	-	-	-	-		-
0.0097	-	0.0089	-	0.0092	0.0092	-	-	-	-	-	-		-
-	-	-	-	-	-	-	-	-	-	-	-		-
-	-	-	-	-	-	-	-	-	-	-	-		-
SWMP03-1M	SWMP03-1M duplicate	SWMP03-5M	SWMP03-5M duplicate	SWMP03-10M	SWMP03-10M duplicate	SWMP03-1M	SWMP03-1M duplicate	SWMP03-5M	SWMP03-10M	SWMP03-1M	SWMP03-5M	SWMP03-5M duplicate	SWMP03-10M
44.0	-	44.0	-	45.9	45.6	43.9	44.8	44.1	44	43.8	44.1	43.5	43.3
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	1.24	1.26	-	-	-	-	1.43	-	-	1.38	-	-
-	-	<3.0	<3.0	-	-	-	-	<3.0	-	-	<3.0	-	-
	-		-		-	5.8	5.8	6.0	6.3	6.1	6.7	6.7	6.8
SWMP03-1M	SWMP03-1M duplicate	SWMP03-5M	SWMP03-5M duplicate	SWMP03-10M	SWMP03-10M duplicate	SWMP03-1M	SWMP03-1M duplicate	SWMP03-5M	SWMP03-10M	SWMP03-1M	SWMP03-5M	SWMP03-5M duplicate	SWMP03-10M
51.6	-	54.5	-	59.6	57.5	57.1	55.1	81.2	53.2	51.8	50.6	51.3	49.0
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
0.18	-	0.19	-	0.15	0.19	0.19	0.17	0.16	0.18	0.23	0.22	0.2	0.2
15.6	-	15.6	-	15.6	16	16.2	15.3	15.8	15.3	17.1	16.9	16.8	16
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
20	-	19	-	20	20	21	21	21	21	19	19	19	18
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
1.77	-	2.48	-	1.36	1.42	2.36	1.87	2.3	2.97	1.6	1.49	1.39	1.28
138	-	140	-	154	150	145	144	147	152	156	152	156	152
0.736	-	0.49	-	0.123	0.133	1.46	0.816	0.953	0.237	0.437	0.245	0.898	0.093
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
26.3	-	26.9	-	28.7	28.2	27.4	26	26	27.1	26.7	26.9	26.6	26.4
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
0.229	-	0.199	-	0.18	0.19	0.191	0.195	0.175	0.19	0.177	0.185	0.182	0.172
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
0.39	-	0.39	-	0.38	0.42	0.48	0.44	0.42	0.42	0.41	0.42	0.4	0.39
0.088	-	0.069	-	0.074	0.058	0.094	0.088	0.072	0.079	0.098	0.088	0.062	0.063
3460	-	3440	-	3560	3510	3710	3690	3710	3690	3720	3740	3700	3580
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
45.8	-	45.6	-	46.2	45.5	46.2	45	46.1	44.5	46	46.8	47.6	45.5
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
1.81	-	1.73	-	1.9	1.85	1.93	1.78	3.38	1.77	1.73	1.55	1.37	1.7
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	0.018	< RDL	< RDL	< RDL
0.63	-	0.59	-	0.62	0.6	0.5	< RDL	0.54	0.51	0.92	0.82	0.79	0.75
7.8	-	< RDL	-	< RDL	< RDL	5.6	5.4	8.6	< RDL	< RDL	4.4	< RDL	< RDL
< RDL	-	< RDL	-	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL	< RDL
15.0	-	15.0	-	15.7	15.6	14.8	15.3	15	15	14.7	14.8	14.6	14.6
1.6	-	1.58	-	1.62	1.62	1.69	1.61	1.61	1.6	1.73	1.73	1.71	1.67
0.304	-	0.304	-	0.312	0.305	0.337	0.297	0.303	0.294	0.309	0.321	0.308	0.298
7.35	-	7.25	-	7.46	7.52	7.99	7.56	7.57	7.52	8.32	8.18	8.08	8.01
1.74	-	1.9	-	1.74	1.75	1.63	1.66	1.69	1.73	1.92	1.82	1.85	1.72

Enos Lake Metals/Nutrients/Anions, E. coli, and PAHs 3rd quarter - AUGUST 2022 (5 times in 30 days)			Sampling Date	2-Aug-2022					Sampling Date	9-Aug-2022					
			Report Date	16-Aug-2022					Report Date	17-Aug-2022					
			C.O.C.	20-982083					C.O.C.	20-992050					
			Job #	VA22B7778					Job #	VA22B8451					
			Lab	ALS					Lab	ALS					
Biotic, Anions & Nutrients	Units	RDL	SWMP03-1M	SWMP03-5M	SWMP03-5M duplicate	SWMP03-10M	SWMP06-1M	SWMP04-1M	SWMP03-1M	SWMP03-5M	SWMP03-10M	SWMP03-10M duplicate	SWMP06-1M	SWMP04-1M
Chlorophyll a	ug/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate (P)	mg/L	0.001	-	-	-	-	-	-	-	-	-	-	-	-
Total Phosphorus (P)	mg/L	0.002	-	-	-	-	-	-	-	-	-	-	-	-
Total Coliforms	MPN/100mL		261	-	-	-	2420	260	-	-	-	-	-	-
E. coli	MPN/100mL	1	<1	-	-	-	1	<1	1	-	-	-	2	1
Physical & Inorganics	Units	RDL	SWMP03-1M	SWMP03-5M	SWMP03-5M duplicate	SWMP03-10M			SWMP03-1M	SWMP03-5M	SWMP03-10M	SWMP03-10M duplicate		
Total Hardness (CaCO3)	mg/L	0.5	45.8	43	44.6	46.5	-	-	48.3	45.7	47.7	46.8	-	-
Dissolved Hardness	mg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity			-	1.37	-	-	-	-	-	1.39	-	-	-	-
TSS			-	<3.0	-	-	-	-	-	3.5	-	-	-	-
pH			-	8.1	7.1	6.9	-	-	7.9	7.0	7.0	6.7	-	-
Total Metals by ICPMS	Units	RDL	SWMP03-1M	SWMP03-5M	SWMP03-5M duplicate	SWMP03-10M			SWMP03-1M	SWMP03-5M	SWMP03-10M	SWMP03-10M duplicate		
Total Aluminum (Al)	ug/L	3	26.5	17.4	18.4	30.2	-	-	31.8	25	44	44.7	-	-
Total Antimony (Sb)	ug/L	0.1	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Arsenic (As)	ug/L	0.1	0.23	0.18	0.18	0.3	-	-	0.25	0.18	0.32	0.29	-	-
Total Barium (Ba)	ug/L	0.1	17.8	16.9	16.4	22.6	-	-	18.5	16.8	23.7	23	-	-
Total Beryllium (Be)	ug/L	0.1	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Bismuth (Bi)	ug/L	0.05	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Boron (B)	ug/L	10	22	20	21	20	-	-	24	21	20	20	-	-
Total Cadmium (Cd)	ug/L	0.005	<RDL	0.0069	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Cesium	ug/L	0.01	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Chromium (Cr)	ug/L	0.5	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Cobalt (Co)	ug/L	0.1	<RDL	<RDL	<RDL	0.14	-	-	<RDL	<RDL	0.21	0.21	-	-
Total Copper (Cu)	ug/L	0.5	1.1	1.02	1.09	0.79	-	-	1.74	1.3	0.98	0.92	-	-
Total Iron (Fe)	ug/L	10	42	61	66	2060	-	-	62	79	2960	2970	-	-
Total Lead (Pb)	ug/L	0.05	0.206	0.242	0.254	0.124	-	-	0.892	1.37	0.235	0.238	-	-
Total Lithium (Li)	ug/L	1	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Manganese (Mn)	ug/L	0.1	17.3	24.2	26.7	207	-	-	30.4	39.7	304	303	-	-
Total Mercury (Hg)	ug/L	0.005	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Molybdenum (Mo)	ug/L	0.05	0.208	0.188	0.191	0.153	-	-	0.198	0.195	0.134	0.126	-	-
Total Nickel (Ni)	ug/L	0.5	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Rubidium	ug/L	0.2	0.51	0.39	0.44	0.54	-	-	0.52	0.45	0.5	0.5	-	-
Total Selenium (Se)	ug/L	0.05	0.068	0.076	0.076	0.084	-	-	0.082	0.083	0.092	0.068	-	-
Total Silicon (Si)	ug/L	100	2760	3120	3120	3920	-	-	2760	3010	4160	4190	-	-
Total Silver (Ag)	ug/L	0.01	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Strontium (Sr)	ug/L	0.2	48.8	44.8	45.2	49.1	-	-	49.3	48.4	50	48.2	-	-
Total Tellurium	ug/L	0.2	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Thallium (Tl)	ug/L	0.01	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Thorium	ug/L	0.1	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Tin (Sn)	ug/L	0.1	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Titanium (Ti)	ug/L	0.3	0.33	0.5	0.55	0.94	-	-	0.59	0.92	1.1	1.24	-	-
Total Tungsten	ug/L	0.1	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Uranium (U)	ug/L	0.01	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Vanadium (V)	ug/L	0.5	0.58	<RDL	<RDL	0.85	-	-	0.64	<RDL	1.11	1.1	-	-
Total Zinc (Zn)	ug/L	3	5.3	3.5	4.8	<RDL	-	-	26.3	6.7	3.8	<RDL	-	-
Total Zirconium (Zr)	ug/L	0.2	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
Total Calcium (Ca)	mg/L	0.05	15.5	14.6	15.2	15.9	-	-	16.5	15.6	16.4	16.1	-	-
Total Magnesium (Mg)	mg/L	0.005	1.72	1.6	1.62	1.66	-	-	1.73	1.65	1.64	1.6	-	-
Total Potassium (K)	mg/L	0.05	0.35	0.321	0.329	0.373	-	-	0.333	0.326	0.382	0.378	-	-
Total Sodium (Na)	mg/L	0.05	7.56	7.17	7.15	7.48	-	-	7.77	7.44	7.31	7.24	-	-
Total Sulphur (S)	mg/L	0.5	1.42	1.51	1.6	0.98	-	-	1.62	1.67	0.6	0.72	-	-

RDL = Reportable Detection Limit

Sampling Date	15-Aug-2022					**Sampling Date**	23-Aug-2022					**Sampling Date**	29-Aug-2022				
Report Date	25-Aug-2022					**Report Date**	31-Aug-2022					**Report Date**	6-Sep-2022				
C.O.C.	20-982084					**C.O.C.**	20-982086					**C.O.C.**	20-982085				
Job #	VA22B8970					**Job #**	VA22B9715					**Job #**	VA22C0292				
Lab	ALS					**Lab**	ALS					**Lab**	ALS				
SWMP03-1M	**SWMP03-5M**	**SWMP03-5M duplicate**	**SWMP03-10M**	**SWMP06-1M**	**SWMP04-1M**	**SWMP03-1M**	**SWMP03-1M duplicate**	**SWMP03-5M**	**SWMP03-10M**	**SWMP06-1M**	**SWMP04-1M**	**SWMP03-1M**	**SWMP03-5M**	**SWMP03-5M duplicate**	**SWMP03-10M**	**SWMP06-1M**	**SWMP04-1M**
5.8	10.0	10.4	10.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<0.0010	0.0012	0.0011	<0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.0091	0.018	0.0188	0.0333	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	75	-	-	-	236	267
2	-	-	-	1	<1	1	-	-	-	7	9	1	-	-	-	6	8
SWMP03-1M	**SWMP03-5M**	**SWMP03-5M duplicate**	**SWMP03-10M**			**SWMP03-1M**	**SWMP03-1M duplicate**	**SWMP03-5M**	**SWMP03-10M**			**SWMP03-1M**	**SWMP03-5M**	**SWMP03-5M duplicate**	**SWMP03-10M**		
48.6	45.4	46	46.8	-	-	44.9	44.6	42.6	44.4	-	-	47.5	44.3	45.4	47.7	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.11	1.2	1.26	3.08	-	-	-	-	1.44	-	-	-	-	1.4	-	-	-	-
<3.0	3.2	<3.0	4.0	-	-	-	-	<3.0	-	-	-	-	<3.0	-	-	-	-
8.1	6.9	6.9	6.7	-	-	8.0	8.0	6.7	6.8	-	-	8.0	6.7	6.7	6.7	-	-
SWMP03-1M	**SWMP03-5M**	**SWMP03-5M duplicate**	**SWMP03-10M**			**SWMP03-1M**	**SWMP03-1M duplicate**	**SWMP03-5M**	**SWMP03-10M**			**SWMP03-1M**	**SWMP03-5M**	**SWMP03-5M duplicate**	**SWMP03-10M**		
26.9	16.5	17.8	33.8	-	-	29.0	28.9	13.8	40.3	-	-	29.3	13.3	15.6	40.4	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
0.25	0.17	0.21	0.33	-	-	0.24	0.24	0.18	0.32	-	-	0.24	0.18	0.19	0.35	-	-
19	18.2	18.4	25	-	-	18.6	18.9	17.9	24.2	-	-	18.8	17.8	18.4	25.5	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
25	22	22	21	-	-	22	23	20	19	-	-	25	21	21	19	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	0.01	-	-	<RDL	<RDL	<RDL	<RDL	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
<RDL	<RDL	<RDL	0.22	-	-	<RDL	<RDL	<RDL	0.23	-	-	<RDL	<RDL	<RDL	0.25	-	-
1.68	1.34	2.05	0.87	-	-	1.76	1.8	1.28	1.13	-	-	1.38	2.7	1.34	2.84	-	-
53	64	63	2810	-	-	71	71	90	3580	-	-	69	65	64	3320	-	-
0.942	0.39	0.789	0.122	-	-	0.391	1.18	0.485	0.237	-	-	1.74	0.167	0.81	0.135	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
28	36.8	36.3	340	-	-	35	35.2	59.1	388	-	-	38.6	55.6	48.5	411	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
0.217	0.191	0.213	0.129	-	-	0.219	0.229	0.196	0.12	-	-	0.209	0.191	0.206	0.121	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
0.47	0.37	0.39	0.52	-	-	0.52	0.52	0.44	0.56	-	-	0.55	0.42	0.42	0.56	-	-
0.086	0.078	0.092	0.094	-	-	<RDL	0.075	0.078	0.061	-	-	0.078	0.059	0.067	0.1	-	-
2770	3120	3020	4120	-	-	2760	2660	2820	4250	-	-	2850	2970	3020	4300	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
50.2	46.5	46.4	46.9	-	-	49.8	50.2	46.3	49.8	-	-	50.1	47.3	48.9	49.3	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
0.37	0.44	0.46	0.94	-	-	0.45	0.5	<RDL	0.98	-	-	0.49	0.31	<RDL	1.05	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
0.55	<RDL	<RDL	1.05	-	-	0.77	0.65	<RDL	1.32	-	-	0.55	<RDL	<RDL	1.22	-	-
6.9	4.3	6.9	<RDL	-	-	5.8	4.9	<RDL	<RDL	-	-	8.8	4.7	7.7	4.9	-	-
<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-	<RDL	<RDL	<RDL	<RDL	-	-
16.6	15.5	15.7	16.1	-	-	15.2	15.1	14.5	15.2	-	-	16.2	15.1	15.5	16.3	-	-
1.74	1.63	1.65	1.6	-	-	1.68	1.68	1.56	1.56	-	-	1.72	1.6	1.64	1.62	-	-
0.35	0.334	0.331	0.391	-	-	0.349	0.35	0.333	0.408	-	-	0.366	0.332	0.342	0.406	-	-
8.26	7.72	7.76	7.53	-	-	7.64	7.65	7.18	7.15	-	-	8.04	7.51	7.64	7.52	-	-
1.64	1.87	1.64	0.9	-	-	1.34	1.15	1.47	<0.50	-	-	1.53	1.68	1.64	0.64	-	-

Table 6: Summary of Sediment PAH results from Enos Lake 2022 Water Quality Monitoring.

Enos Lake	**Sampling Date**	15-Aug-2022	
Sediment PAHs	**Report Date**	25-Aug-2022	
3rd quarter - AUG 2022	**C.O.C.**	20-982084	
	Job #	VA22B8970	
	Lab	ALS	

Physical Testing (SOIL)	Units			**SWMP06**		**SWMP04**		**SWMP03**	
Moisture	%			35.9		58.7		94.9	

CCME PAH IN SEDIMENTS BY GC-MS (SOIL)									
Calculated Parameters			**UNITS**	**SWMP 06 PAH**	**RDL**	**SWMP 04 PAH**	**RDL**	**SWMP 03 PAH**	**RDL**
Index of Additive Cancer Risk (IARC)	N/A	IACR AB (coarse)	N/A	<0.10	0.1	<0.10	0.1	0.22	0.16
		IACR (CCME)	N/A	<0.60	0.6	<0.60	0.6	6.07	0.6
		IACR AB (fine)	N/A	<0.10	0.1	<0.10	0.1	0.42	0.16

BC Water Quality Guidelines

Polycyclic Aromatics										Sediment Threshold - Max. Approved (BCMOECCS)*	Sediment Threshold - Max. Working (CCME)
Acenaphthene	mg/kg (or ug/g)	Acenaphthene		<0.050	0.05	<0.050	0.05	<0.164	0.164	0.15 (No Effect)	0.0202 (No Effect) or 0.201 (Probable Effect)
Acenaphthylene	mg/kg (or ug/g)	Acenaphthylene		<0.050	0.05	<0.050	0.05	<0.164	0.164	-	0.00587 (No Effect) or 0.128 (Probable Effect)
Acridine	mg/kg (or ug/g)	Acridine		<0.050	0.05	<0.050	0.05	<0.164	0.164	1 (No Effect)	-
Anthracene	mg/kg (or ug/g)	Anthracene		<0.050	0.05	<0.050	0.05	<0.164	0.164	0.6 (No Effect)	0.0469 (No Effect) or 0.245 (Probable Effect)
Benzo(a)anthracene	mg/kg (or ug/g)	Benzo(a)anthracene		<0.050	0.05	<0.050	0.05	0.168	0.164	0.2 (No Effect)	0.0317 (No Effect) or 0.385 (Probable Effect)
Benzo(a)pyrene	mg/kg (or ug/g)	Benzo(a)pyrene		<0.050	0.05	<0.050	0.05	0.268	0.164	0.06 (No Effect)	0.0319 (No Effect) or 0.782 (Probable Effect)
Benzo(b+j)fluoranthene	mg/kg (or ug/g)	Benzo(b+j)fluoranthene		<0.050	0.05	<0.050	0.05	0.575	0.164	N/A	N/A
Benzo(b+j+k)fluoranthene	mg/kg (or ug/g)	Benzo(b+j+k)fluoranthene		<0.075	0.075	<0.075	0.075	0.575	0.232	N/A	N/A
Benzo(g,h,i)perylene	mg/kg (or ug/g)	Benzo(g,h,i)perylene		<0.050	0.05	<0.050	0.05	0.568	0.164	-	0.17 (No Effect) or 3.2 (Probable Effect)
Benzo(k)fluoranthene	mg/kg (or ug/g)	Benzo(k)fluoranthene		<0.050	0.05	<0.050	0.05	<0.164	0.164	-	0.24 (No Effect) or 13.4 (Probable Effect)
Chrysene	mg/kg (or ug/g)	Chrysene		<0.050	0.05	<0.050	0.05	0.187	0.164	-	0.0571 (No Effect) or 0.862 (Probable Effect)
Dibenz(a,h)anthracene	mg/kg (or ug/g)	Dibenz(a,h)anthracene		<0.050	0.05	<0.050	0.05	<0.164	0.164	-	0.00622 (No Effect) or 0.135 (Probable Effect)
Fluoranthene	mg/kg (or ug/g)	Fluoranthene		<0.050	0.05	<0.050	0.05	0.48	0.164	2 (No Effect)	0.111 (No Effect) or 2.36 (Probable Effect)
Fluorene	mg/kg (or ug/g)	Fluorene		<0.050	0.05	<0.050	0.05	<0.164	0.164	0.2 (No Effect)	0.0212 (No Effect) or 0.144 (Probable Effect)
Indeno(1,2,3-cd)pyrene	mg/kg (or ug/g)	Indeno(1,2,3-cd)pyrene		<0.050	0.05	<0.050	0.05	0.537	0.164	-	0.2 (No Effect) or 3.21 (Probable Effect)
Methylnaphthalene, 1+2-	mg/kg (or ug/g)	methylnaphthalene, 1+2-		<0.075	0.075	<0.075	0.075	<0.232	0.232	N/A	N/A
Methylnaphthalene, 1-	mg/kg (or ug/g)	methylnaphthalene, 1-		<0.050	0.05	<0.050	0.05	<0.164	0.164	N/A	N/A
Methylnaphthalene, 2-	mg/kg (or ug/g)	methylnaphthalene, 2-		<0.050	0.05	<0.050	0.05	<0.164	0.164	-	0.0202 (No Effect) or 0.201 (Probable Effect)
Naphthalene	mg/kg (or ug/g)	naphthalene		<0.050	0.05	<0.050	0.05	<0.164	0.164	0.01 (No Effect)	0.0346 (No Effect) or 0.391 (Probable Effect)
Phenanthrene	mg/kg (or ug/g)	phenanthrene		<0.050	0.05	<0.050	0.05	0.196	0.164	0.04 (No Effect)	0.0419 (No Effect) or 0.515 (Probable Effect)
Pyrene	mg/kg (or ug/g)	pyrene		<0.050	0.05	<0.050	0.05	0.434	0.164	-	0.053 (No Effect) or 0.875 (Probable Effect)
Quinoline	mg/kg (or ug/g)	quinoline		<0.050	0.05	<0.050	0.05	<0.164	0.164		3.4 (No Effect)
B(a)P total potency equivalents	mg/kg (or ug/g)	B(a)P total potency equivalents		<0.065	0.065	<0.065	0.065	0.494	0.164	N/A	N/A
Total PAH	mg/kg (or ug/g)	PAHs, total (BC Sched 3.4)		<0.20	0.2	<0.20	0.2	1.73	0.59	-	4 (No Effect), 35 (Probable Effect), 100 (Severe Effect) ***
	mg/kg (or ug/g)	PAHs, total (EPA 16)		<0.20	0.2	<0.20	0.2	3.41	0.66		
		Surrogate Recovery (%)									
		acridine-d9	%	83.5		88.9		86.5			
		chrysene-d12	%	89		89.5		88.9			
		naphthalene-d8	%	78.3		81.5		80.1			
		phenanthrene-d10	%	79.8		83.4		82.6			

DLHM Detection Limit Adjusted: Sample has high moisture content.

HTD Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.

* Sediment containing 1% organic carbon

** Based on background approach method. EC & MOE QUEBEC (not CCME)

*** Based on Long and Morgan 1990 and Persuad et al. 1993

4.0 Discussion

The primary intent of the Enos Lake monitoring program is to understand better the lake's productivity trends (PGL 2016; Deniseger 2022) and to build a consistent, long-term database to assess the overall health of Enos Lake with respect to ongoing development, land use, and increasing population within the watershed (Deniseger 2020; Nordin 2017; PGL 2016). The general management objective for Enos Lake is to maintain pre-development water quality and to avoid eutrophication (PGL 2016).

Watershed disturbances such as logging, road building, development, and climate change impact all have potential to shift the lake's trophic status through increased stormwater runoff, nutrient loading, rising air and water temperatures, and seasonal variability in precipitation. Therefore, it is important to take surrounding land use and seasonal climate patterns into account when interpreting the water quality trends of Enos Lake.

4.1 Air temperature and precipitation

The spring of 2022 was influenced by cool and wet weather for the east coast of Vancouver Island (Deniseger 2022; Environment Canada 2022). This was followed by extended drought and heat during the summer of 2022. Little to no precipitation was recorded between mid-July and late October (Fig. 2), characterizing the fall of 2022 as being unusually warm and dry.

2022 was nearly the inverse of weather patterns recorded in 2021; when a “heat dome” event caused early spring heat and drought, followed by an “atmospheric river” event in fall that caused flooding and significant precipitation. These types of extreme weather patterns are predicted to occur more frequently as the impacts of climate change unfold. Long-term trends of warming air and water temperatures will cause summer lake stratification to begin earlier and extend later in the year (Deniseger 2021).

4.2 In situ Field Parameters

WATER CLARITY

Secchi depth is a relatively simple measure of clarity, which can provide insight into lake health and productivity (Deniseger 2021). The Secchi readings collected in 2022 followed a similar trend as in 2021 and 2020, indicating an early spring phytoplankton bloom occurred in late February. The advantage of additional Secchi depth observations collected by the Friends of Enos Lake throughout the year allows for a broader understanding of Enos Lake's ecological dynamics. Monthly Secchi readings should continue, as it is a relatively inexpensive and simple way to gain additional insight into blooms or sediment loading.

TEMPERATURE

Water temperature influences the lake’s susceptibility to watershed activities and disturbance. Also, it affects several chemical and physical water quality parameters and a. It has a significant and pronounced effect on stratification and mixing (Deniseger 2021). Enos Lake usually begins to stratify as early as March and April thermally, and undergoes fall turnover between October and November (Nordin 2017 and Deniseger 2018). In 2022, isothermal mixing was noted in February while stratification was observed in

May, suggesting adherence to this typical pattern. Stratification continued through late summer, contributing to the strongly anoxic conditions observed below 5 m depth in August (Deniseger 2022). The additional results collected by Friends of Enos Lake suggest stratification persisted well into September. By November, the lake was fully mixed.

DISSOLVED OXYGEN

The epilimnion has not dropped below the DO target since sampling began in 2017; however, the hypolimnion is consistently below target in summer. This is mentioned in the ELPMP as a natural existing condition of the lake (PGL 2016). The anoxic conditions in the hypolimnion are due to a combination of isolation from the atmosphere and decomposition of organic matter (Deniseger 2022). It is highly likely that the summer droughts and heat which have occurred over the last two years have exacerbated the lack of oxygen at depth (Deniseger 2022). Enos Lake is susceptible to a late summer fish kill if wind-induced mixing draws deeper anoxic water to the surface (Deniseger 2022). This presents a risk for the Enos Lake stickleback species.

4.3 Laboratory Samples

PHOSPHOROUS

In lakes, phosphorus is an important nutrient and key indicator of productivity. Excessive phosphorus can result in blooms and low DO levels, which impacts water quality and fish health (Deniseger 2021).

Total Phosphorus in August exceeded guidelines. Concentrations were 18.4 µg/L at 5 meters, increasing to 33.3 µg/L at depth, reflecting internal loading of phosphorus caused by strongly anoxic conditions (Deniseger 2022). By November, concentrations had decreased to 11.7 – 14.1 µg/L, which is still somewhat elevated for the time of year and reflects the lack of overall flushing due to low precipitation through the fall (Deniseger 2022). Total phosphorus levels appear to have increased in 2022 relative to the past three years.

Once lakes become eutrophic or hypereutrophic, it is challenging to reverse this process. Prevention is a far more effective tool in protecting lake water quality (Deniseger 2022). Preventative measures include limiting nutrient loading caused by land disturbance and runoff, which can achieved through preservation of native vegetation and wide riparian buffers, avoidance of pavement or large lawnscapes in favour of permeable pavements or forested landscapes, sediment mitigation measures during construction, and a stormwater management plan to capture and treat runoff (WDNR 2006).

CHLOROPHYLL-A

The concentration of chlorophyll-*a*, a major photosynthetic pigment of algae, is an indicator of the amount of algae in water and is another parameter used to assess biological productivity of Enos Lake. A target for Enos Lake outlined in the ELPMP was to avoid any increase in chlorophyll-*a* over time from the baseline values ranging from 0.17 – 19.8 µg/L (Table 2). Based on the data gathered over the last six years, this target has thus far been met.

General trophic status classification using Total P and chlorophyll-*a* is summarized in Table 7 below, per comments in Deniseger (2021). All results are discussed in further detail in Deniseger (2022) (Appendix 2).

Table 7: Summary of trophic status classification based on chlorophyll-*a* and total phosphorous.

Total phosphorous	<10 µg/L [1]	Oligotrophic
	10 - 30 µg/L [1]	Mesotrophic
	>30 µg/L [1]	Eutrophic
Chlorophyll-*a*	<2 µg/L	Oligotrophic
	2 - 7 µg/L	Mesotrophic
	>7 µg/L	Eutrophic

[1] In lakes with longer residence times (>1 year), the Total P assessment is based on concentrations at spring overturn, prior to the establishment of a thermocline. In lakes with shorter residence times (<1 year), it is based on an annual mean.

Using the assessment methods in Table 7 for mean annual Total P, Enos Lake would be considered mesotrophic (or moderately productive) from 2017-2018 and 2020-2022, but oligotrophic (low productivity) in 2019. Using the assessment method for mean annual chlorophyll-*a*, Enos Lake would be considered mesotrophic in 2019 and 2021, but eutrophic (or highly productive) in 2017-2018, 2020, and 2022.

This year-to-year variability highlights the importance of building a longer-term dataset which can help illustrate trends over time. As lakes become more eutrophic (more biologically productive), algal blooms (including blue green algal blooms) can become more prevalent which leads to lower DO concentrations, impaired water quality, and impacts on recreational use and drinking water (Deniseger 2022).

Climate change will present further challenges as summer water temperatures increase, prompting further growth of algae and phytoplankton. The past two years are likely examples of the transition to more extreme summer conditions predicted in the future (Deniseger 2022).

E. COLI

Bacteriological sampling found that *E. coli* was well within the BC guidelines for primary recreational use (swimming).

METALS

Metals were generally well within the BC guidelines for aquatic life, although additional data is required for accurate interpretation of Aluminum, Copper, and Zinc.

Iron exceeded BC water quality guidelines at depth in August 2017 and August 2022. This was due to the mid-summer anoxic conditions in the deeper waters of Enos Lake which caused internal loading of phosphorous and subsequent release of iron and manganese (Deniseger 2022). In the fall, when the thermocline breaks down and the oxygen is replenished at depth, much of the phosphorus and iron would return to Enos Lake's sediment (Deniseger 2022).

Further information is required to interpret results. As dissolved organic carbon in water was not included as a required parameter in the ELPMP, consideration of the recommendations in this report should be made for future metals sampling.

PAHs

Polycyclic aromatic hydrocarbons (PAHs) indicate the presence of hydrocarbons and combustion products in sediment (Deniseger 2022). While some PAHs have been detected in Enos Lake, there is no information on the source or whether it is historic or recent (Deniseger 2022). In the ELPMP, the purpose for monitoring PAHs is to monitor potential contributions from surface runoff of hydrocarbons from road development and general industrial activity (PGL 2016).

Further information is required for the interpretation of results; as percent organic carbon content of sediment was not included as a required parameter in the ELPMP, consideration of the recommendations in this report should be made for future PAH sampling. Additional samples are required for long-term trend analysis.

4.4 Invasive Species & Wildlife Observations

A BCCF biologist trained in invasive aquatic plant ID attended all sampling dates except August 2, 2022. The BCCF team made incidental observations of aquatic and terrestrial plants, per recommendations in the ELPMP (PGL 2016). No aquatic invasive species were noted again in 2022.

Invasive species, such as Eurasian watermilfoil, are known be present nearby. Within the Enos Lake watershed, Dolphin Lake was treated with herbicides in 2017 for Eurasian milfoil (ClearLake Solutions 2017).

The wildlife observations in 2022 reaffirm the importance of Enos Lake as a habitat for multiple species, including birds of prey, waterfowl, mammals, and fish.

5.0 Recommendations

1. Ongoing monitoring and water quality protection efforts will help prevent Enos Lake from undergoing significant detrimental change in productivity. Future monitoring should, at minimum, follow the suggested schedule and guidelines as laid out in the ELPMP (PGL 2016).

2. Of specific concern in 2021 and 2022, the trend of intensifying hypoxia at depth and extending into the thermocline requires close attention to late summer mixing that could result in fish die-offs in the coming years.

3. 2022 again showed the value of additional Secchi measurements. This should continue year-round, as volunteer capacity allows.

4. Additional parameters should be collected during future monitoring of metals in Enos Lake, including Dissolved Organic Carbon (once per 5-week sampling event, at each sampling depth) and Dissolved Copper. Additional analysis including % organic carbon should be performed for future sediment sampling.

5. A water budget for Enos Lake is recommended in order to support long-term watershed management planning.

6. Additional suggestions for data accuracy include continuing to implement a QA/QC program to increase confidence in field data collection methods and lab analysis results (e.g., duplicate and field blank samples, duplicate YSI readings on ascent & descent of probes).

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Appendix 1 – Laboratory results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22A2093**	Page	: 1 of 4
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: Enos1302084	Date Samples Received	: 02-Feb-2022 08:45
PO	: ----	Date Analysis Commenced	: 03-Feb-2022
C-O-C number	: 20-986009	Issue Date	: 11-Feb-2022 11:01
Sampler	: TR/Chris		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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*
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP03-1m	SWMP03-1m rep	SWMP03-5m	SWMP03-10m	----
					Client sampling date / time	01-Feb-2022 10:40	01-Feb-2022 10:43	01-Feb-2022 10:48	01-Feb-2022 10:54	----
						VA22A2093-001	VA22A2093-002	VA22A2093-003	VA22A2093-004	--------
						Result	Result	Result	Result	----
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		42.2	42.8	42.0	42.0	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		----	----	<3.0	----	----
turbidity	----	E121	0.10	NTU		----	----	1.50	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0672	0.0557	0.0830	0.0831	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00017	0.00018	0.00017	0.00018	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0149	0.0151	0.0151	0.0155	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.019	0.019	0.019	0.019	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
calcium, total	7440-70-2	E420	0.050	mg/L		14.4	14.7	14.3	14.3	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	0.00134	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00172	0.00152	0.00144	0.00135	----
iron, total	7439-89-6	E420	0.010	mg/L		0.162	0.154	0.167	0.163	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000210	0.000367	0.000194	0.000155	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.51	1.49	1.52	1.53	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0272	0.0270	0.0276	0.0274	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000174	0.000218	0.000172	0.000167	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.310	0.301	0.305	0.307	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00042	0.00041	0.00039	0.00044	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000111	0.000120	0.000066	0.000079	----
silicon, total	7440-21-3	E420	0.10	mg/L		3.61	3.56	3.68	3.67	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP03-1m	SWMP03-1m rep	SWMP03-5m	SWMP03-10m	----
					Client sampling date / time	01-Feb-2022 10:40	01-Feb-2022 10:43	01-Feb-2022 10:48	01-Feb-2022 10:54	----
						VA22A2093-001	VA22A2093-002	VA22A2093-003	VA22A2093-004	--------
						Result	Result	Result	Result	----
Total Metals										
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		7.09	6.99	6.99	7.09	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0437	0.0424	0.0434	0.0449	----
sulfur, total	7704-34-9	E420	0.50	mg/L		1.96	2.02	1.75	1.88	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00224	0.00165	0.00350	0.00354	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00096	0.00087	0.00086	0.00085	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0030	0.0037	<0.0030	<0.0030	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	0.00021	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A2093**	Page	: 1 of 6
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: Enos1302084	Date Samples Received	: 02-Feb-2022 08:45
PO	: ----	Issue Date	: 11-Feb-2022 11:01
C-O-C number	: 20-986009		
Sampler	: TR/Chris		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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 Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE										
SWMP03-5m	E160	01-Feb-2022	----	----	----		03-Feb-2022	7 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SWMP03-5m	E121	01-Feb-2022	----	----	----		03-Feb-2022	3 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-10m	E508	01-Feb-2022	----	----	----		05-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-1m	E508	01-Feb-2022	----	----	----		05-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-1m rep	E508	01-Feb-2022	----	----	----		05-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-5m	E508	01-Feb-2022	----	----	----		05-Feb-2022	28 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP03-10m	E420	01-Feb-2022	----	----	----		09-Feb-2022	180 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP03-1m	E420	01-Feb-2022	----	----	----		09-Feb-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP03-1m rep	E420	01-Feb-2022	----	----	----		09-Feb-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP03-5m	E420	01-Feb-2022	----	----	----		09-Feb-2022	180 days	8 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)							
Total Mercury in Water by CVAAS	E508	403338	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	405597	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	402171	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	402109	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Total Mercury in Water by CVAAS	E508	403338	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	405597	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	402171	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	402109	1	20	5.0	5.0	✓
Method Blanks (MB)							
Total Mercury in Water by CVAAS	E508	403338	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	405597	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	402171	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	402109	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Total Mercury in Water by CVAAS	E508	403338	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	405597	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
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22A2093**	Page	: 1 of 10
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: Enos1302084	Date Samples Received	: 02-Feb-2022 08:45
PO	: ----	Date Analysis Commenced	: 03-Feb-2022
C-O-C number	: 20-986009	Issue Date	: 11-Feb-2022 11:01
Sampler	: TR/Chris		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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 Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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 Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 402109)											
KS2200300-001	Anonymous	turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 402171)											
VA22A2085-013	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	27.6	28.8	1.2	Diff <2x LOR	----
Total Metals (QC Lot: 403338)											
VA22A2086-002	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 405597)											
VA22A2085-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 405597) - continued											
VA22A2085-001	Anonymous	silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	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: 402109)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 402171)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Total Metals (QCLot: 403338)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 405597)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 405597) - continued						
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 402109)									
turbidity	----	E121	0.1	NTU	200 NTU	98.6	85.0	115	----
Physical Tests (QCLot: 402171)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	94.6	85.0	115	----
Total Metals (QCLot: 403338)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
Total Metals (QCLot: 405597)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	103	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	100	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	98.6	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	99.1	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	100	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	106	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	99.4	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.3	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	100	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	100	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.8	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	116	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	105	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	106	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	90.4	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	100.0	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 405597) - continued									
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	109	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	98.6	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.0	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	103	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	99.9	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	97.6	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	97.4	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
Total Metals (QCLot: 403338)										
VA22A2086-003	Anonymous	mercury, total	7439-97-6	E508	0.0000934 mg/L	0.0001 mg/L	93.4	70.0	130	----
Total Metals (QCLot: 405597)										
VA22A2085-002	Anonymous	aluminum, total	7429-90-5	E420	0.190 mg/L	0.2 mg/L	95.1	70.0	130	----
		antimony, total	7440-36-0	E420	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		barium, total	7440-39-3	E420	0.0195 mg/L	0.02 mg/L	97.3	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0386 mg/L	0.04 mg/L	96.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		boron, total	7440-42-8	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00397 mg/L	0.004 mg/L	99.2	70.0	130	----
		calcium, total	7440-70-2	E420	3.86 mg/L	4 mg/L	96.4	70.0	130	----
		cesium, total	7440-46-2	E420	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		chromium, total	7440-47-3	E420	0.0398 mg/L	0.04 mg/L	99.6	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		copper, total	7440-50-8	E420	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		iron, total	7439-89-6	E420	1.96 mg/L	2 mg/L	98.0	70.0	130	----
		lead, total	7439-92-1	E420	0.0189 mg/L	0.02 mg/L	94.7	70.0	130	----
		lithium, total	7439-93-2	E420	0.0953 mg/L	0.1 mg/L	95.3	70.0	130	----
		magnesium, total	7439-95-4	E420	0.952 mg/L	1 mg/L	95.2	70.0	130	----
		manganese, total	7439-96-5	E420	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0198 mg/L	0.02 mg/L	99.2	70.0	130	----
		nickel, total	7440-02-0	E420	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.27 mg/L	10 mg/L	92.7	70.0	130	----
		potassium, total	7440-09-7	E420	3.81 mg/L	4 mg/L	95.3	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0200 mg/L	0.02 mg/L	100.0	70.0	130	----
		selenium, total	7782-49-2	E420	0.0414 mg/L	0.04 mg/L	104	70.0	130	----
		silicon, total	7440-21-3	E420	9.90 mg/L	10 mg/L	99.0	70.0	130	----
		silver, total	7440-22-4	E420	0.00393 mg/L	0.004 mg/L	98.2	70.0	130	----
		sodium, total	7440-23-5	E420	1.94 mg/L	2 mg/L	96.9	70.0	130	----
		strontium, total	7440-24-6	E420	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		sulfur, total	7704-34-9	E420	18.8 mg/L	20 mg/L	94.2	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
Total Metals (QCLot: 405597) - continued										
VA22A2085-002	Anonymous	tellurium, total	13494-80-9	E420	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		thallium, total	7440-28-0	E420	0.00382 mg/L	0.004 mg/L	95.4	70.0	130	----
		thorium, total	7440-29-1	E420	0.0214 mg/L	0.02 mg/L	107	70.0	130	----
		tin, total	7440-31-5	E420	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		titanium, total	7440-32-6	E420	0.0398 mg/L	0.04 mg/L	99.5	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		uranium, total	7440-61-1	E420	0.00400 mg/L	0.004 mg/L	100	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0969 mg/L	0.1 mg/L	96.9	70.0	130	----
		zinc, total	7440-66-6	E420	0.379 mg/L	0.4 mg/L	94.7	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0398 mg/L	0.04 mg/L	99.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 986009

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	BC Conservation Fdn.	Select Report Format: [X] PDF [X] EXCEL [ ] EDD (DIGITAL)	[X] Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Thea Rodgers	Merge QC/QCI Reports with COA [X] YES [ ] NO [ ] N/A	[ ] 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:	250-390-2525 x. 104	[ ] Compare Results to Criteria on Report - provide details below if box checked	[ ] 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution: [X] EMAIL [ ] MAIL [ ] FAX	[ ] 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	#105-1885 Boxwood Road	Email 1 or Fax trodgers@bccf.com	[ ] 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	Nanaimo, BC	Email 2	[ ] Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests
Postal Code:	V9	Email 3	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm
Invoice To	Same as Report To [X] YES [ ] NO	Invoice Recipients	For all tests with rush TATs requested, please contact your AM to confirm availability.
	Copy of Invoice with Report [X] YES [ ] NO	Select Invoice Distribution: [X] EMAIL [ ] MAIL [ ] FAX	
Company:		Email 1 or Fax	
Contact:		Email 2 limerick@bccf.com	

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA2022 BCCF 1000001	AFE/Cost Center:	PO#
Job #:	FnoS 1302084	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact: Sneha S.	Sampler: TR / Chris

Environmental Division Vancouver
Work Order Reference
VA22A2093
Telephone : +1 604 253 4188

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	Indicate Filtered (F), P	Total metals /	Hardness / Hg	TSS / Turbidity	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	Swmp 03 - 1m	01-02-22	10:40	Water	2		✓					
	Swmp 03 - 1m rep	01-02-22	10:43	Water	2		✓					
	Swmp 03 - 5m	01-02-22	10:48	Water	3		✓		✓			
	Swmp 03 - 10 m	01-02-22	10:54	Water	2		✓					

* Lab filtration required.

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	None are field filtered to reduce handling. Please filter/preserve ASAP.
Are samples for human consumption/ use? [ ] YES [ ] NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: [ ] NONE [ ] ICE [ ] ICE PACKS [ ] FROZEN [ ] COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: [ ] YES [ ] NO

Cooler Custody Seals Intact: [ ] YES [ ] N/A Sample Custody Seals Intact: [ ] YES [ ] N/A

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

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: TR.	Date: 01-02-22	Time: 1330	Received by:	Date:	Time:	Received by: JCK	Date: Feb 2/22	Time: 8:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22A2563**	Page	: 1 of 4
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: ENOS 1302084	Date Samples Received	: 09-Feb-2022 08:40
PO	: ----	Date Analysis Commenced	: 10-Feb-2022
C-O-C number	: 20-986002	Issue Date	: 18-Feb-2022 16:20
Sampler	: ----		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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*
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP 03-1m	SWMP 03-5m	SWMP 03-5m duplicate	SWMP 03-10m	----
					Client sampling date / time	08-Feb-2022 10:00	08-Feb-2022 10:05	08-Feb-2022 10:08	08-Feb-2022 10:15	----
						VA22A2563-001	VA22A2563-002	VA22A2563-003	VA22A2563-004	--------
						Result	Result	Result	Result	----
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		41.1	41.5	41.8	41.7	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		----	<3.0	----	----	----
turbidity	----	E121	0.10	NTU		----	1.40	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0580	0.0617	0.0581	0.0642	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00018	0.00018	0.00017	0.00018	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0145	0.0145	0.0144	0.0144	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.018	0.019	0.019	0.019	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
calcium, total	7440-70-2	E420	0.050	mg/L		14.0	14.1	14.2	14.2	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00154	0.00158	0.00145	0.00134	----
iron, total	7439-89-6	E420	0.010	mg/L		0.132	0.141	0.139	0.144	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000981	0.000430	0.000234	0.000097	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.49	1.54	1.53	1.52	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0248	0.0257	0.0256	0.0263	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000176	0.000174	0.000190	0.000172	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.290	0.297	0.299	0.296	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00036	0.00041	0.00040	0.00038	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000111	<0.000050	0.000087	0.000086	----
silicon, total	7440-21-3	E420	0.10	mg/L		3.40	3.44	3.44	3.49	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	SWMP 03-1m	SWMP 03-5m	SWMP 03-5m duplicate	SWMP 03-10m	----
					Client sampling date / time	08-Feb-2022 10:00	08-Feb-2022 10:05	08-Feb-2022 10:08	08-Feb-2022 10:15	----
Analyte	CAS Number	Method	LOR	Unit		VA22A2563-001	VA22A2563-002	VA22A2563-003	VA22A2563-004	--------
						Result	Result	Result	Result	----
Total Metals										
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		6.74	6.87	6.80	6.82	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0416	0.0423	0.0421	0.0408	----
sulfur, total	7704-34-9	E420	0.50	mg/L		1.50	1.59	1.65	1.69	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00204	0.00230	0.00217	0.00237	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00050	0.00052	0.00051	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0055	0.0042	<0.0030	<0.0030	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A2563**	Page	: 1 of 6
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: ENOS 1302084	Date Samples Received	: 09-Feb-2022 08:40
PO	: ----	Issue Date	: 18-Feb-2022 16:20
C-O-C number	: 20-986002		
Sampler	: ----		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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 Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE										
SWMP 03-5m	E160	08-Feb-2022	----	----	----		10-Feb-2022	7 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SWMP 03-5m	E121	08-Feb-2022	----	----	----		11-Feb-2022	3 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP 03-10m	E508	08-Feb-2022	----	----	----		12-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP 03-1m	E508	08-Feb-2022	----	----	----		12-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP 03-5m	E508	08-Feb-2022	----	----	----		12-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP 03-5m duplicate	E508	08-Feb-2022	----	----	----		12-Feb-2022	28 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP 03-10m	E420	08-Feb-2022	----	----	----		17-Feb-2022	180 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP 03-1m	E420	08-Feb-2022	----	----	----		17-Feb-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP 03-5m	E420	08-Feb-2022	----	----	----		17-Feb-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP 03-5m duplicate	E420	08-Feb-2022	----	----	----		17-Feb-2022	180 days	9 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)							
Total Mercury in Water by CVAAS	E508	408734	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	412258	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	407001	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	408280	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Total Mercury in Water by CVAAS	E508	408734	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	412258	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	407001	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	408280	1	20	5.0	5.0	✓
Method Blanks (MB)							
Total Mercury in Water by CVAAS	E508	408734	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	412258	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	407001	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	408280	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Total Mercury in Water by CVAAS	E508	408734	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	412258	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
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22A2563**	Page	: 1 of 10
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: ENOS 1302084	Date Samples Received	: 09-Feb-2022 08:40
PO	: ----	Date Analysis Commenced	: 10-Feb-2022
C-O-C number	: 20-986002	Issue Date	: 18-Feb-2022 16:20
Sampler	: ----		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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 Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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 Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 407001)											
VA22A2543-004	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 408280)											
KS2200376-001	Anonymous	turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Total Metals (QC Lot: 408734)											
VA22A2502-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 412258)											
FJ2200379-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	0.0040	0.0010	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00010	0.00012	0.00002	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00011	<0.00010	0.000009	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.108	0.112	3.46%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000218	0.0000263	0.0000046	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	52.1	52.8	1.26%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0063	0.0064	0.00008	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	14.0	14.2	1.36%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00108	0.00104	3.77%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00270	0.00272	0.814%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.425	0.422	0.003	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000795	0.000908	13.3%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.73	1.78	2.87%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 412258) - continued											
FJ2200379-001	Anonymous	silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	2.52	2.48	1.56%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.247	0.249	0.775%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	10.8	11.6	6.45%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000471	0.000489	3.85%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	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: 407001)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 408280)						
turbidity	----	E121	0.1	NTU	<0.10	----
Total Metals (QCLot: 408734)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 412258)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 412258) - continued						
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 407001)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	93.8	85.0	115	----
Physical Tests (QCLot: 408280)									
turbidity	----	E121	0.1	NTU	200 NTU	100	85.0	115	----
Total Metals (QCLot: 408734)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	97.1	80.0	120	----
Total Metals (QCLot: 412258)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	101	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	110	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	106	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	99.3	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.9	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	102	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	108	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	105	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	107	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	111	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	107	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	104	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	100	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.3	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	103	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 412258) - continued									
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	99.5	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	103	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	109	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	100	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	103	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	100	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	106	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	106	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	106	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	107	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	102	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
Total Metals (QCLot: 408734)										
VA22A2502-002	Anonymous	mercury, total	7439-97-6	E508	0.0000932 mg/L	0.0001 mg/L	93.2	70.0	130	----
Total Metals (QCLot: 412258)										
FJ2200379-002	Anonymous	aluminum, total	7429-90-5	E420	0.187 mg/L	0.2 mg/L	93.4	70.0	130	----
		antimony, total	7440-36-0	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0383 mg/L	0.04 mg/L	95.7	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00949 mg/L	0.01 mg/L	94.9	70.0	130	----
		boron, total	7440-42-8	E420	0.096 mg/L	0.1 mg/L	95.8	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00382 mg/L	0.004 mg/L	95.5	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00990 mg/L	0.01 mg/L	99.0	70.0	130	----
		chromium, total	7440-47-3	E420	0.0398 mg/L	0.04 mg/L	99.5	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		copper, total	7440-50-8	E420	0.0189 mg/L	0.02 mg/L	94.4	70.0	130	----
		iron, total	7439-89-6	E420	1.89 mg/L	2 mg/L	94.4	70.0	130	----
		lead, total	7439-92-1	E420	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		lithium, total	7439-93-2	E420	0.0942 mg/L	0.1 mg/L	94.2	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, total	7440-02-0	E420	0.0371 mg/L	0.04 mg/L	92.7	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.1 mg/L	10 mg/L	101	70.0	130	----
		potassium, total	7440-09-7	E420	3.94 mg/L	4 mg/L	98.4	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		selenium, total	7782-49-2	E420	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		silicon, total	7440-21-3	E420	9.24 mg/L	10 mg/L	92.4	70.0	130	----
		silver, total	7440-22-4	E420	0.00380 mg/L	0.004 mg/L	95.1	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 412258) - continued										
FJ2200379-002	Anonymous	tellurium, total	13494-80-9	E420	0.0386 mg/L	0.04 mg/L	96.6	70.0	130	----
		thallium, total	7440-28-0	E420	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		thorium, total	7440-29-1	E420	0.0217 mg/L	0.02 mg/L	109	70.0	130	----
		tin, total	7440-31-5	E420	0.0198 mg/L	0.02 mg/L	99.2	70.0	130	----
		titanium, total	7440-32-6	E420	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		uranium, total	7440-61-1	E420	0.00394 mg/L	0.004 mg/L	98.5	70.0	130	----
		vanadium, total	7440-62-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.383 mg/L	0.4 mg/L	95.9	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0402 mg/L	0.04 mg/L	101	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 986002

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver

Work Order Reference VA22A2563

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	BC Conservation Foundation	Select Report Format: ☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)	☒ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Thea Rodgers.	Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:	250 390 3582 ext 104.	☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	#105-1885 BOXWOOD ROAD	Email 1 or Fax trodgers@bccf.com	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	NANAIMO BC	Email 2	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additio may apply to rush requests on weekends, statutory holidays and non-rout
Postal Code:	V9S 5X9	Email 3	Date and Time Required for all E&P TATs:
Invoice To	Same as Report To ☒ YES ☐ NO	Invoice Recipients	For all tests with rush TATs requested, please cor
	Copy of Invoice with Report ☒ YES ☐ NO	Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX	Analysis Requ
Company:		Email 1 or Fax	Indicate Filtered (F), Preserved (P) or Filtered and
Contact:		Email 2 llimerick@bccf.com	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA2022 BCCF 1000001	AFE/Cost Center:	PO#:
Job #:	ENOS 1302084	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	A2563	ALS Contact: Sheila.	Sampler: AA / TR.

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	Total metals + hardness	Total mercury	TSS/Turbidity	SAMPLES ON HOLD	EXTENDED STORAGE REQ	SUSPECTED HAZARD (see
	SWMP 03 - 1m	08-02	10:00	Water	2	✓	✓				
	SWMP 03 - 5m	08-02	10:05	"	3	✓	✓	✓			
	SWMP 03 - 5m duplicate	08-02	10:08	"	2	✓	✓				
	SWMP 03 - 10m	08-02	10:15	"	2	✓	✓				
						* Lab filtration required.					

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	Please filter + preserve ASAP.
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)								
Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED								
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO								
Cooler Custody Seals Intact: ☐ YES ☐ N/A	Sample Custody Seals Intact: ☐ YES ☐ N/A							
INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C				
				6°C				

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: TR	Date: 02/08/2022	Time: 1300	Received by:	Date:	Time:	Received by:	Date: Feb 9/22	Time: 8:40

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22A3162**	Page	: 1 of 6
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: ENOS 1302084	Date Samples Received	: 16-Feb-2022 08:45
PO	: ----	Date Analysis Commenced	: 17-Feb-2022
C-O-C number	: 20-986008	Issue Date	: 28-Feb-2022 16:42
Sampler	: DS, TR		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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*
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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*
µg/L	micrograms per litre
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-1m	SWMP-1m Rep	SWMP-5m	SWMP-5m Rep	SWMP-10m
					Client sampling date / time	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022
						VA22A3162-001	VA22A3162-002	VA22A3162-003	VA22A3162-004	VA22A3162-005
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		44.0	----	44.0	----	45.9
solids, total suspended [TSS]	----	E160	3.0	mg/L		----	----	<3.0	<3.0	----
turbidity	----	E121	0.10	NTU		----	----	1.24	1.26	----
Anions and Nutrients										
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		----	0.0011	<0.0010	<0.0010	0.0013
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0097	----	0.0089	----	0.0092
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0516	----	0.0545	----	0.0596
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	----	<0.00010	----	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00018	----	0.00019	----	0.00015
barium, total	7440-39-3	E420	0.00010	mg/L		0.0156	----	0.0156	----	0.0156
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	----	<0.000100	----	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	----	<0.000050	----	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L		0.020	----	0.019	----	0.020
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	----	<0.0000050	----	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L		15.0	----	15.0	----	15.7
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	----	<0.000010	----	<0.000010
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	----	<0.00050	----	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	----	<0.00010	----	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L		0.00177	----	0.00248	----	0.00136
iron, total	7439-89-6	E420	0.010	mg/L		0.138	----	0.140	----	0.154
lead, total	7439-92-1	E420	0.000050	mg/L		0.000736	----	0.000490	----	0.000123
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	----	<0.0010	----	<0.0010
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.60	----	1.58	----	1.62
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0263	----	0.0269	----	0.0287
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	----	<0.0000050	----	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000229	----	0.000199	----	0.000180
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	----	<0.00050	----	<0.00050
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	----	<0.050	----	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L		0.304	----	0.304	----	0.312
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00039	----	0.00039	----	0.00038

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-1m	SWMP-1m Rep	SWMP-5m	SWMP-5m Rep	SWMP-10m
					Client sampling date / time	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022
						VA22A3162-001	VA22A3162-002	VA22A3162-003	VA22A3162-004	VA22A3162-005
						Result	Result	Result	Result	Result
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000088	----	0.000069	----	0.000074
silicon, total	7440-21-3	E420	0.10	mg/L		3.46	----	3.44	----	3.56
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	----	<0.000010	----	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L		7.35	----	7.25	----	7.46
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0458	----	0.0456	----	0.0462
sulfur, total	7704-34-9	E420	0.50	mg/L		1.74	----	1.90	----	1.74
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	----	<0.00020	----	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	----	<0.000010	----	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	----	<0.00010	----	<0.00010
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	----	<0.00010	----	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00181	----	0.00173	----	0.00190
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	----	<0.00010	----	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	----	<0.000010	----	<0.000010
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00063	----	0.00059	----	0.00062
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0078	----	<0.0030	----	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	----	<0.00020	----	<0.00020
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg/L		8.86	8.26	7.10	----	8.15

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-10m Rep	----	----	----	----
					Client sampling date / time	15-Feb-2022	----	----	----	----
						VA22A3162-006	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		45.6	----	----	----	----
Anions and Nutrients										
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0092	----	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0575	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00019	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0160	----	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.020	----	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		15.6	----	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	----	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	----	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00142	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.150	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000133	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.62	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0282	----	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000190	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	----	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.305	----	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00042	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000058	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		3.51	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	----	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		7.52	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-10m Rep	----	----	----	----
					Client sampling date / time	15-Feb-2022	----	----	----	----
						VA22A3162-006	--------	--------	--------	--------
						Result	----	----	----	----
Total Metals										
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0455	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		1.75	----	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	----	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00185	----	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00060	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	----	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A3162**	Page	: 1 of 8
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: ENOS 1302084	Date Samples Received	: 16-Feb-2022 08:45
PO	: ----	Issue Date	: 28-Feb-2022 16:42
C-O-C number	: 20-986008		
Sampler	: DS, TR		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
SWMP-10m	E378-U	15-Feb-2022	----	----	----		17-Feb-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
SWMP-1m Rep	E378-U	15-Feb-2022	----	----	----		17-Feb-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
SWMP-5m	E378-U	15-Feb-2022	----	----	----		17-Feb-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
SWMP-5m Rep	E378-U	15-Feb-2022	----	----	----		17-Feb-2022	3 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SWMP-10m	E372-U	15-Feb-2022	25-Feb-2022	----	----		26-Feb-2022	28 days	12 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SWMP-10m Rep	E372-U	15-Feb-2022	25-Feb-2022	----	----		26-Feb-2022	28 days	12 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SWMP-1m	E372-U	15-Feb-2022	25-Feb-2022	----	----		26-Feb-2022	28 days	12 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SWMP-5m	E372-U	15-Feb-2022	25-Feb-2022	----	----		26-Feb-2022	28 days	12 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SWMP-5m	E160	15-Feb-2022	----	----	----		17-Feb-2022	7 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SWMP-5m Rep	E160	15-Feb-2022	----	----	----		17-Feb-2022	7 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SWMP-5m	E121	15-Feb-2022	----	----	----		18-Feb-2022	3 days	4 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SWMP-5m Rep	E121	15-Feb-2022	----	----	----		18-Feb-2022	3 days	4 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP-10m	E870	15-Feb-2022	17-Feb-2022	2 days	2 days	× EHTL	28-Feb-2022	672 hrs	11 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP-1m	E870	15-Feb-2022	17-Feb-2022	2 days	2 days	× EHTL	28-Feb-2022	672 hrs	11 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP-1m Rep	E870	15-Feb-2022	17-Feb-2022	2 days	2 days	× EHTL	28-Feb-2022	672 hrs	11 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP-5m	E870	15-Feb-2022	17-Feb-2022	2 days	2 days	× EHTL	28-Feb-2022	672 hrs	11 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) SWMP-10m	E508	15-Feb-2022	----	----	----		18-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) SWMP-10m Rep	E508	15-Feb-2022	----	----	----		18-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) SWMP-1m	E508	15-Feb-2022	----	----	----		18-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) SWMP-5m	E508	15-Feb-2022	----	----	----		18-Feb-2022	28 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-10m	E420	15-Feb-2022	----	----	----		25-Feb-2022	180 days	11 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-10m Rep	E420	15-Feb-2022	----	----	----		25-Feb-2022	180 days	11 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-1m	E420	15-Feb-2022	----	----	----		25-Feb-2022	180 days	11 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-5m	E420	15-Feb-2022	----	----	----		25-Feb-2022	180 days	11 days	✓

Legend & Qualifier Definitions

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

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)							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	412875	1	4	25.0	5.0	✓
Total Mercury in Water by CVAAS	E508	413909	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	416508	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	418501	1	6	16.6	5.0	✓
TSS by Gravimetry	E160	412189	1	2	50.0	5.0	✓
Turbidity by Nephelometry	E121	413687	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Chlorophyll-a by Fluorometry	E870	412544	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	412875	1	4	25.0	5.0	✓
Total Mercury in Water by CVAAS	E508	413909	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	416508	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	418501	1	6	16.6	5.0	✓
TSS by Gravimetry	E160	412189	1	2	50.0	5.0	✓
Turbidity by Nephelometry	E121	413687	1	19	5.2	5.0	✓
Method Blanks (MB)							
Chlorophyll-a by Fluorometry	E870	412544	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	412875	1	4	25.0	5.0	✓
Total Mercury in Water by CVAAS	E508	413909	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	416508	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	418501	1	6	16.6	5.0	✓
TSS by Gravimetry	E160	412189	1	2	50.0	5.0	✓
Turbidity by Nephelometry	E121	413687	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	412875	1	4	25.0	5.0	✓
Total Mercury in Water by CVAAS	E508	413909	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	416508	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	418501	1	6	16.6	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
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U Vancouver - Environmental	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.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Chlorophyll-a by Fluorometry	E870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Total Phosphorus in water	EP372	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			
Chlorophyll-a Extraction	EP870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

QUALITY CONTROL REPORT

Work Order	: **VA22A3162**	Page	: 1 of 10
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: ENOS 1302084	Date Samples Received	: 16-Feb-2022 08:45
PO	: ----	Date Analysis Commenced	: 17-Feb-2022
C-O-C number	: 20-986008	Issue Date	: 28-Feb-2022 16:42
Sampler	: DS, TR		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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 Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 412189)											
VA22A3162-003	SWMP-5m	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 413687)											
FJ2200446-002	Anonymous	turbidity	----	E121	0.10	NTU	2.75	2.72	1.10%	15%	----
Anions and Nutrients (QC Lot: 412875)											
VA22A3162-002	SWMP-1m Rep	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0011	<0.0010	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 418501)											
VA21C8035-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0658	0.0631	4.14%	20%	----
Total Metals (QC Lot: 413909)											
VA22A3060-001	Anonymous	mercury, total	7439-97-6	E508	0.0050	mg/L	<0.0050 µg/L	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 416508)											
VA22A3154-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0480	0.0477	0.561%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00012	0.00013	0.00001	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00011	<0.00010	0.00001	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0206	0.0206	0.0122%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	20.5	20.8	1.36%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000018	0.000018	0.00000004	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00209	0.00208	0.000003	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00050	0.00058	0.00007	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.032	0.035	0.002	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	0.614	0.603	1.78%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00174	0.00186	6.90%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00322	0.00317	1.68%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 416508) - continued											
VA22A3154-001	Anonymous	potassium, total	7440-09-7	E420	0.050	mg/L	0.819	0.815	0.548%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00154	0.00153	0.000008	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000088	0.000075	0.000012	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.96	1.99	1.14%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	3.27	3.27	0.0454%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.136	0.139	2.10%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	15.1	14.6	2.94%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00131	0.00123	0.00008	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000026	0.000027	0.000001	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00071	0.00062	0.00009	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	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: 412189)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 413687)						
turbidity	----	E121	0.1	NTU	<0.10	----
Anions and Nutrients (QCLot: 412875)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 418501)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Total Metals (QCLot: 413909)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 416508)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 416508) - continued						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Plant Pigments (QCLot: 412544)						
chlorophyll a	479-61-8	E870	0.01	µg/L	<0.010	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 412189)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	86.7	85.0	115	----
Physical Tests (QCLot: 413687)									
turbidity	----	E121	0.1	NTU	200 NTU	100	85.0	115	----
Anions and Nutrients (QCLot: 412875)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	94.9	80.0	120	----
Anions and Nutrients (QCLot: 418501)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	93.8	80.0	120	----
Total Metals (QCLot: 413909)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	99.6	80.0	120	----
Total Metals (QCLot: 416508)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	104	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	110	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	107	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	99.4	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	104	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	107	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	113	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	120	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	107	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	101	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	108	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	99.6	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	103	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 416508) - continued									
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	104	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.3	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	105	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	102	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	106	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	103	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	101	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	100	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	101	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	106	80.0	120	----
Plant Pigments (QCLot: 412544)									
chlorophyll a	479-61-8	E870	0.01	µg/L	5 µg/L	88.3	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: 412875)										
VA22A3162-003	SWMP-5m	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0301 mg/L	0.03 mg/L	100	70.0	130	----
Anions and Nutrients (QCLot: 418501)										
VA22A3162-001	SWMP-1m	phosphorus, total	7723-14-0	E372-U	0.0506 mg/L	0.05 mg/L	101	70.0	130	----
Total Metals (QCLot: 413909)										
VA22A3066-001	Anonymous	mercury, total	7439-97-6	E508	0.0000999 mg/L	0.0001 mg/L	99.9	70.0	130	----
Total Metals (QCLot: 416508)										
VA22A3154-002	Anonymous	aluminum, total	7429-90-5	E420	0.197 mg/L	0.2 mg/L	98.5	70.0	130	----
		antimony, total	7440-36-0	E420	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		barium, total	7440-39-3	E420	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0106 mg/L	0.01 mg/L	106	70.0	130	----
		boron, total	7440-42-8	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00420 mg/L	0.004 mg/L	105	70.0	130	----
		calcium, total	7440-70-2	E420	4.05 mg/L	4 mg/L	101	70.0	130	----
		cesium, total	7440-46-2	E420	0.0104 mg/L	0.01 mg/L	104	70.0	130	----
		chromium, total	7440-47-3	E420	0.0396 mg/L	0.04 mg/L	99.1	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		copper, total	7440-50-8	E420	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		iron, total	7439-89-6	E420	1.95 mg/L	2 mg/L	97.7	70.0	130	----
		lead, total	7439-92-1	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		lithium, total	7439-93-2	E420	0.0953 mg/L	0.1 mg/L	95.3	70.0	130	----
		magnesium, total	7439-95-4	E420	0.969 mg/L	1 mg/L	96.9	70.0	130	----
		manganese, total	7439-96-5	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		nickel, total	7440-02-0	E420	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.70 mg/L	10 mg/L	97.0	70.0	130	----
		potassium, total	7440-09-7	E420	3.95 mg/L	4 mg/L	98.7	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		selenium, total	7782-49-2	E420	0.0413 mg/L	0.04 mg/L	103	70.0	130	----
		silicon, total	7440-21-3	E420	9.12 mg/L	10 mg/L	91.2	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
Total Metals (QCLot: 416508) - continued										
VA22A3154-002	Anonymous	silver, total	7440-22-4	E420	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		sodium, total	7440-23-5	E420	1.98 mg/L	2 mg/L	99.1	70.0	130	----
		strontium, total	7440-24-6	E420	0.0211 mg/L	0.02 mg/L	106	70.0	130	----
		sulfur, total	7704-34-9	E420	19.9 mg/L	20 mg/L	99.5	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0410 mg/L	0.04 mg/L	102	70.0	130	----
		thallium, total	7440-28-0	E420	0.00395 mg/L	0.004 mg/L	98.7	70.0	130	----
		thorium, total	7440-29-1	E420	0.0214 mg/L	0.02 mg/L	107	70.0	130	----
		tin, total	7440-31-5	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		titanium, total	7440-32-6	E420	0.0399 mg/L	0.04 mg/L	99.7	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0195 mg/L	0.02 mg/L	97.3	70.0	130	----
		uranium, total	7440-61-1	E420	0.00407 mg/L	0.004 mg/L	102	70.0	130	----
		vanadium, total	7440-62-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		zinc, total	7440-66-6	E420	0.420 mg/L	0.4 mg/L	105	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0416 mg/L	0.04 mg/L	104	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 006008

Page

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver
Work Order Reference
VA22A3162

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	BC conservation Fdn.
Contact:	Thea Rodgers
Phone:	250-390-2525 ext 104
	Company address below will appear on the final report
Street:	#105-1885 Boxwood RD
City/Province:	NANAIMO
Postal Code:	
Invoice To	Same as Report To ☒ YES ☐ NO
	Copy of Invoice with Report ☒ YES ☐ NO
Company:	BCCF
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	trodgers@bccf.com
Email 2	
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	limerick@bccf.com
Email 2	

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

Project Information	
ALS Account # / Quote #:	VA 2022 BCCF 1000 001
Job #:	ENS 1302084
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: Sneha	Sampler: TRIDS.

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	Total meta IS+	Hardness+ Hg	TSS / Turbidity	Chlorophyll-a (NOT Filtered)	Total P (H2SO4)	Ortho P	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	Swmp - 1m	15-02-22		Water		✓			✓	✓	✓			
	Swmp - 1m rep.	"		"					✓		✓			
	Swmp - 5m	"		"		✓		✓	✓	✓	✓			
	Swmp - 5m rep.	"		"				✓			✓			
	Swmp - 10m	"		"		✓			✓	✓	✓			
	Swmp - 10m rep.	"		"		✓				✓				

* Lab filtration required

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	Chlorophyll-a=raw, not filtered.
Are samples for human consumption/ use? ☐ YES ☐ NO	Please filter asap (wi 48 hrs.)

SAMPLE RECEIPT DETAILS (ALS use only)						
Cooling Method:	☐ NONE	☐ ICE	☐ ICE PACKS	☐ FROZEN	☐ COOLING INITIATED	
Submission Comments identified on Sample Receipt Notification:					☐ YES	☐ NO
Cooler Custody Seals Intact:	☐ YES	☐ N/A	Sample Custody Seals Intact:		☐ YES	☐ N/A
INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C		
				7		

SHIPMENT RELEASE (client use)		
Released by: DS	Date: Feb 15	Time: 1230

INITIAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)		
Received by: JA	Date: 2/16/2022	Time: 8:45 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22A3571**	Page	: 1 of 4
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: ENOS 1302084	Date Samples Received	: 23-Feb-2022 09:00
PO	: ----	Date Analysis Commenced	: 25-Feb-2022
C-O-C number	: 20-986007	Issue Date	: 09-Mar-2022 15:41
Sampler	: AA/TN		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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*
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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*
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP03-1m	SWMP03-1m rep	SWMP03-5m	SWMP03-10m	----
					Client sampling date / time	22-Feb-2022 10:57	22-Feb-2022 10:58	22-Feb-2022 11:02	22-Feb-2022 11:06	----
						VA22A3571-001	VA22A3571-002	VA22A3571-003	VA22A3571-004	--------
						Result	Result	Result	Result	----
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		43.9	44.8	44.1	44.0	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		----	----	<3.0	----	----
turbidity	----	E121	0.10	NTU		----	----	1.43	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0571	0.0551	0.0812	0.0532	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00019	0.00017	0.00016	0.00018	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0162	0.0153	0.0158	0.0153	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.021	0.021	0.021	0.021	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
calcium, total	7440-70-2	E420	0.050	mg/L		14.8	15.3	15.0	15.0	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00236	0.00187	0.00230	0.00297	----
iron, total	7439-89-6	E420	0.010	mg/L		0.145	0.144	0.147	0.152	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.00146	0.000816	0.000953	0.000237	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.69	1.61	1.61	1.60	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0274	0.0260	0.0260	0.0271	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000191	0.000195	0.000175	0.000190	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.337	0.297	0.303	0.294	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00048	0.00044	0.00042	0.00042	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000094	0.000088	0.000072	0.000079	----
silicon, total	7440-21-3	E420	0.10	mg/L		3.71	3.69	3.71	3.69	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	SWMP03-1m	SWMP03-1m rep	SWMP03-5m	SWMP03-10m	----
					Client sampling date / time	22-Feb-2022 10:57	22-Feb-2022 10:58	22-Feb-2022 11:02	22-Feb-2022 11:06	----
Analyte	CAS Number	Method	LOR	Unit		VA22A3571-001	VA22A3571-002	VA22A3571-003	VA22A3571-004	--------
						Result	Result	Result	Result	----
Total Metals										
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		7.99	7.56	7.57	7.52	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0462	0.0450	0.0461	0.0445	----
sulfur, total	7704-34-9	E420	0.50	mg/L		1.63	1.66	1.69	1.73	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00193	0.00178	0.00338	0.00177	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00050	<0.00050	0.00054	0.00051	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0056	0.0054	0.0086	<0.0030	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A3571**	Page	: 1 of 6
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: ENOS 1302084	Date Samples Received	: 23-Feb-2022 09:00
PO	: ----	Issue Date	: 09-Mar-2022 15:40
C-O-C number	: 20-986007		
Sampler	: AA/TN		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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 Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE										
SWMP03-5m	E160	22-Feb-2022	----	----	----		28-Feb-2022	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SWMP03-5m	E121	22-Feb-2022	----	----	----		25-Feb-2022	3 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-10m	E508	22-Feb-2022	----	----	----		26-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-1m	E508	22-Feb-2022	----	----	----		26-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-1m rep	E508	22-Feb-2022	----	----	----		26-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-5m	E508	22-Feb-2022	----	----	----		26-Feb-2022	28 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP03-10m	E420	22-Feb-2022	----	----	----		04-Mar-2022	180 days	10 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP03-1m	E420	22-Feb-2022	----	----	----		04-Mar-2022	180 days	10 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP03-1m rep	E420	22-Feb-2022	----	----	----		04-Mar-2022	180 days	10 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP03-5m	E420	22-Feb-2022	----	----	----		04-Mar-2022	180 days	10 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)							
Total Mercury in Water by CVAAS	E508	418912	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	421505	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	420144	1	15	6.6	5.0	✓
Turbidity by Nephelometry	E121	418174	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Total Mercury in Water by CVAAS	E508	418912	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	421505	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	420144	1	15	6.6	5.0	✓
Turbidity by Nephelometry	E121	418174	1	17	5.8	5.0	✓
Method Blanks (MB)							
Total Mercury in Water by CVAAS	E508	418912	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	421505	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	420144	1	15	6.6	5.0	✓
Turbidity by Nephelometry	E121	418174	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
Total Mercury in Water by CVAAS	E508	418912	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	421505	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
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22A3571**	Page	: 1 of 10
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: ENOS 1302084	Date Samples Received	: 23-Feb-2022 09:00
PO	: ----	Date Analysis Commenced	: 25-Feb-2022
C-O-C number	: 20-986007	Issue Date	: 09-Mar-2022 15:40
Sampler	: AA/TN		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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 Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

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

Signatories	*Position*	*Laboratory Department*
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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 Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 418174)											
KS2200536-002	Anonymous	turbidity	----	E121	0.10	NTU	0.68	0.66	0.03	Diff <2x LOR	----
Physical Tests (QC Lot: 420144)											
FJ2200497-002	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Total Metals (QC Lot: 418912)											
VA22A3567-013	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 421505)											
VA22A3565-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.103	0.102	1.27%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00350	0.00352	0.434%	20%	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00881	0.00889	0.885%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0142	0.0146	3.23%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	0.00239	0.00242	1.31%	20%	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	0.00333	0.00332	0.441%	20%	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.019	0.020	0.0006	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.00320	0.00321	0.388%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	20.8	21.5	3.42%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00746	0.00752	0.774%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00783	0.00786	0.314%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00864	0.00868	0.480%	20%	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.018	0.019	0.0004	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.00305	0.00308	0.715%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0108	0.0109	0.883%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	5.56	5.49	1.29%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00893	0.00889	0.463%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00432	0.00434	0.470%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00525	0.00562	6.77%	20%	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.03	1.02	0.405%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00074	0.00079	0.00005	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00491	0.00501	2.08%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	0.42	0.39	0.03	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 421505) - continued											
VA22A3565-001	Anonymous	silver, total	7440-22-4	E420	0.000010	mg/L	0.00165	0.00166	0.592%	20%	----
		sodium, total	7440-23-5	E420	0.050	mg/L	9.18	9.14	0.502%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.117	0.120	2.61%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	6.00	6.15	2.47%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.00417	0.00429	2.89%	20%	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	0.00292	0.00294	0.594%	20%	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00322	0.00329	1.87%	20%	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00401	0.00406	1.18%	20%	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00518	0.00522	0.808%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0062	0.0061	0.0001	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	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: 418174)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 420144)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Total Metals (QCLot: 418912)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 421505)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 421505) - continued						
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 418174)									
turbidity	----	E121	0.1	NTU	200 NTU	100	85.0	115	----
Physical Tests (QCLot: 420144)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	85.5	85.0	115	----
Total Metals (QCLot: 418912)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
Total Metals (QCLot: 421505)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	113	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	112	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	108	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	109	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	116	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	112	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	108	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	111	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	110	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	107	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	107	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	108	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	108	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	112	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	107	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	110	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	106	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	105	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	110	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	116	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	108	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	103	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	111	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 421505) - continued									
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	112	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	99.6	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	119	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	108	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	99.7	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	107	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	104	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	108	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	111	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	105	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
Total Metals (QCLot: 418912)										
VA22A3567-017	Anonymous	mercury, total	7439-97-6	E508	0.0000846 mg/L	0.0001 mg/L	84.6	70.0	130	----
Total Metals (QCLot: 421505)										
VA22A3565-002	Anonymous	aluminum, total	7429-90-5	E420	0.205 mg/L	0.2 mg/L	103	70.0	130	----
		antimony, total	7440-36-0	E420	0.0211 mg/L	0.02 mg/L	106	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		barium, total	7440-39-3	E420	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0438 mg/L	0.04 mg/L	110	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00973 mg/L	0.01 mg/L	97.3	70.0	130	----
		boron, total	7440-42-8	E420	0.110 mg/L	0.1 mg/L	110	70.0	130	----
		cadmium, total	7440-43-9	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0107 mg/L	0.01 mg/L	107	70.0	130	----
		chromium, total	7440-47-3	E420	0.0406 mg/L	0.04 mg/L	101	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0199 mg/L	0.02 mg/L	99.6	70.0	130	----
		copper, total	7440-50-8	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		iron, total	7439-89-6	E420	2.00 mg/L	2 mg/L	99.8	70.0	130	----
		lead, total	7439-92-1	E420	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		lithium, total	7439-93-2	E420	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0222 mg/L	0.02 mg/L	111	70.0	130	----
		nickel, total	7440-02-0	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.95 mg/L	10 mg/L	99.5	70.0	130	----
		potassium, total	7440-09-7	E420	3.79 mg/L	4 mg/L	94.6	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		selenium, total	7782-49-2	E420	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		silicon, total	7440-21-3	E420	9.79 mg/L	10 mg/L	97.9	70.0	130	----
		silver, total	7440-22-4	E420	0.00409 mg/L	0.004 mg/L	102	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	20.1 mg/L	20 mg/L	100	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 421505) - continued										
VA22A3565-002	Anonymous	tellurium, total	13494-80-9	E420	0.0461 mg/L	0.04 mg/L	115	70.0	130	----
		thallium, total	7440-28-0	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		thorium, total	7440-29-1	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		tin, total	7440-31-5	E420	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		titanium, total	7440-32-6	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		zinc, total	7440-66-6	E420	0.434 mg/L	0.4 mg/L	108	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0448 mg/L	0.04 mg/L	112	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 986007

Page 1 of 1

ALS www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver
Work Order Reference
VA22A3571

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	BC Conservation Foundation
Contact:	Thea Rodgers
Phone:	250-390-3525 ext. 104
	Company address below will appear on the final report
Street:	#105-1885 Boxwood Rd.
City/Province:	Nanaimo
Postal Code:	BC V9S 5X9
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	trodgers@bccf.com
Email 2	
Email 3	
Invoice Recipients	
Select Invoice Distribution:	☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	llimenich@bccf.com
Email 2	

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

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA2022-BCCF1000001	AFE/Cost Center:	PO#
Job #:	302084 ENOS	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	A3571	ALS Contact: Sneha	Sampler: AA/TN

Analysis Req

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

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	Total nutals, Hg, hardness	Turbidity / TSS	SAMPLES ON HOLD	EXTENDED STORAGE REQUIR	SUSPECTED HAZARD (see noti
	SWMP03-1m	22-02-22	10:57	WATER	2	✓				
	SWMP03-1m rep	22-02-22	10:58	"	2	✓				
	SWMP03-5m	22-02-22	11:02	"	3	✓	✓			
	SWMP03-10m	22-02-22	11:06	"	2	✓				

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	

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
						2	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: AA/TN	Date: 22-02-22	Time: 1300	Received by:	Date:	Time:	Received by: JC	Date: 23 Feb 2022	Time: 9 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS 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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22A4191**	Page	: 1 of 4
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1302084 ENOS	Date Samples Received	: 01-Mar-2022 08:40
PO	: ----	Date Analysis Commenced	: 03-Mar-2022
C-O-C number	: 20-986006	Issue Date	: 10-Mar-2022 17:10
Sampler	: PL/TR		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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*
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-03-1m	SWMP-03-5m	SWMP-03-5m rep	SWMP-03-10m	----
					Client sampling date / time	28-Feb-2022 10:30	28-Feb-2022 10:35	28-Feb-2022 10:37	28-Feb-2022 10:41	----
						VA22A4191-001	VA22A4191-002	VA22A4191-003	VA22A4191-004	--------
						Result	Result	Result	Result	----
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		43.8	44.1	43.5	43.3	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		----	<3.0	----	----	----
turbidity	----	E121	0.10	NTU		----	1.38	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0518	0.0506	0.0513	0.0490	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00023	0.00022	0.00020	0.00020	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0171	0.0169	0.0168	0.0160	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.019	0.019	0.019	0.018	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
calcium, total	7440-70-2	E420	0.050	mg/L		14.7	14.8	14.6	14.6	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00160	0.00149	0.00139	0.00128	----
iron, total	7439-89-6	E420	0.010	mg/L		0.156	0.152	0.156	0.152	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000437	0.000245	0.000898	0.000093	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.73	1.73	1.71	1.67	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0267	0.0269	0.0266	0.0264	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000177	0.000185	0.000182	0.000172	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.309	0.321	0.308	0.298	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00041	0.00042	0.00040	0.00039	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000098	0.000088	0.000062	0.000063	----
silicon, total	7440-21-3	E420	0.10	mg/L		3.72	3.74	3.70	3.58	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	SWMP-03-1m	SWMP-03-5m	SWMP-03-5m rep	SWMP-03-10m	----
					Client sampling date / time	28-Feb-2022 10:30	28-Feb-2022 10:35	28-Feb-2022 10:37	28-Feb-2022 10:41	----
Analyte	CAS Number	Method	LOR	Unit		VA22A4191-001	VA22A4191-002	VA22A4191-003	VA22A4191-004	--------
						Result	Result	Result	Result	----
Total Metals										
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		8.32	8.18	8.08	8.01	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0460	0.0468	0.0476	0.0455	----
sulfur, total	7704-34-9	E420	0.50	mg/L		1.92	1.82	1.85	1.72	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00173	0.00155	0.00137	0.00170	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000018	<0.000010	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00092	0.00082	0.00079	0.00075	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	0.0044	<0.0030	<0.0030	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A4191**	Page	: 1 of 6
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1302084 ENOS	Date Samples Received	: 01-Mar-2022 08:40
PO	: ----	Issue Date	: 10-Mar-2022 17:10
C-O-C number	: 20-986006		
Sampler	: PL/TR		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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 Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE										
SWMP-03-5m	E160	28-Feb-2022	----	----	----		04-Mar-2022	7 days	5 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SWMP-03-5m	E121	28-Feb-2022	----	----	----		03-Mar-2022	3 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03-10m	E508	28-Feb-2022	----	----	----		07-Mar-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03-1m	E508	28-Feb-2022	----	----	----		07-Mar-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03-5m	E508	28-Feb-2022	----	----	----		07-Mar-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03-5m rep	E508	28-Feb-2022	----	----	----		07-Mar-2022	28 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP-03-10m	E420	28-Feb-2022	----	----	----		03-Mar-2022	180 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP-03-1m	E420	28-Feb-2022	----	----	----		03-Mar-2022	180 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP-03-5m	E420	28-Feb-2022	----	----	----		03-Mar-2022	180 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP-03-5m rep	E420	28-Feb-2022	----	----	----		03-Mar-2022	180 days	3 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)							
Total Mercury in Water by CVAAS	E508	425609	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	422755	1	16	6.2	5.0	✓
TSS by Gravimetry	E160	424537	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	422326	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Total Mercury in Water by CVAAS	E508	425609	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	422755	1	16	6.2	5.0	✓
TSS by Gravimetry	E160	424537	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	422326	1	19	5.2	5.0	✓
Method Blanks (MB)							
Total Mercury in Water by CVAAS	E508	425609	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	422755	1	16	6.2	5.0	✓
TSS by Gravimetry	E160	424537	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	422326	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Total Mercury in Water by CVAAS	E508	425609	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	422755	1	16	6.2	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
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Hardness (Calculated) from Total Ca/Mg	EC100A Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22A4191**	Page	: 1 of 10
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1302084 ENOS	Date Samples Received	: 01-Mar-2022 08:40
PO	: ----	Date Analysis Commenced	: 03-Mar-2022
C-O-C number	: 20-986006	Issue Date	: 10-Mar-2022 17:10
Sampler	: PL/TR		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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 Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

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

Signatories	*Position*	*Laboratory Department*
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 422326)											
VA22A4191-002	SWMP-03-5m	turbidity	----	E121	0.10	NTU	1.38	1.34	3.38%	15%	----
Physical Tests (QC Lot: 424537)											
KS2200649-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	9.5	8.9	0.6	Diff <2x LOR	----
Total Metals (QC Lot: 422755)											
FJ2200533-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0456	0.0419	8.36%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00121	0.00123	1.31%	20%	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00098	0.00101	0.00004	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.132	0.131	0.945%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.145	0.145	0.153%	20%	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.000127	0.000122	4.13%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	230	228	0.520%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000027	0.000027	0.00000001	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00075	0.00076	0.000001	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00109	0.00103	0.00006	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.170	0.169	0.313%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000090	0.000081	0.000009	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.266	0.267	0.258%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	93.1	91.9	1.34%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.152	0.150	1.32%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00707	0.00728	2.91%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.0172	0.0168	2.49%	20%	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	0.508	0.458	0.050	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	12.4	12.1	1.99%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00916	0.00918	0.142%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.0290	0.0284	2.24%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	6.93	6.96	0.394%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	183	185	0.866%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 422755) - continued											
FJ2200533-001	Anonymous	strontium, total	7440-24-6	E420	0.00020	mg/L	0.379	0.378	0.404%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	199	203	1.79%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000013	0.000013	0.00000003	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00189	0.00160	0.00029	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.0135	0.0136	1.36%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00111	0.00108	0.00004	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0091	0.0076	0.0015	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 425609)											
FJ2200569-001	Anonymous	mercury, total	7439-97-6	E508	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: 422326)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 424537)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Total Metals (QCLot: 422755)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 422755) - continued						
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 425609)						
mercury, total	7439-97-6	E508	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	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 422326)									
turbidity	----	E121	0.1	NTU	200 NTU	97.5	85.0	115	----
Physical Tests (QCLot: 424537)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	92.8	85.0	115	----
Total Metals (QCLot: 422755)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	93.3	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	84.8	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	92.7	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	94.6	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	82.0	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	84.5	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	100	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	93.3	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	81.4	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	83.2	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	90.6	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	92.6	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	90.6	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	101	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	83.6	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	84.7	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	94.2	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	93.7	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	86.1	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	92.0	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	96.7	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	93.0	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	93.6	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	85.8	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	87.3	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	83.0	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	94.4	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	88.4	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	86.9	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 422755) - continued									
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	97.6	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	82.7	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	80.5	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	84.1	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.4	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	82.0	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	83.1	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	94.4	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	92.4	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	82.9	80.0	120	----
Total Metals (QCLot: 425609)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 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
Total Metals (QCLot: 422755)										
FJ2200537-001	Anonymous	aluminum, total	7429-90-5	E420	2.04 mg/L	2 mg/L	102	70.0	130	----
		antimony, total	7440-36-0	E420	0.191 mg/L	0.2 mg/L	95.7	70.0	130	----
		arsenic, total	7440-38-2	E420	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		barium, total	7440-39-3	E420	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		beryllium, total	7440-41-7	E420	0.402 mg/L	0.4 mg/L	100	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0993 mg/L	0.1 mg/L	99.3	70.0	130	----
		boron, total	7440-42-8	E420	1.01 mg/L	1 mg/L	101	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0413 mg/L	0.04 mg/L	103	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.1000 mg/L	0.1 mg/L	100.0	70.0	130	----
		chromium, total	7440-47-3	E420	0.411 mg/L	0.4 mg/L	103	70.0	130	----
		cobalt, total	7440-48-4	E420	0.205 mg/L	0.2 mg/L	102	70.0	130	----
		copper, total	7440-50-8	E420	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		iron, total	7439-89-6	E420	20.6 mg/L	20 mg/L	103	70.0	130	----
		lead, total	7439-92-1	E420	0.196 mg/L	0.2 mg/L	98.3	70.0	130	----
		lithium, total	7439-93-2	E420	1.01 mg/L	1 mg/L	101	70.0	130	----
		magnesium, total	7439-95-4	E420	9.71 mg/L	10 mg/L	97.1	70.0	130	----
		manganese, total	7439-96-5	E420	0.209 mg/L	0.2 mg/L	104	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.187 mg/L	0.2 mg/L	93.5	70.0	130	----
		nickel, total	7440-02-0	E420	0.414 mg/L	0.4 mg/L	104	70.0	130	----
		phosphorus, total	7723-14-0	E420	104 mg/L	100 mg/L	104	70.0	130	----
		potassium, total	7440-09-7	E420	40.4 mg/L	40 mg/L	101	70.0	130	----
		rubidium, total	7440-17-7	E420	0.214 mg/L	0.2 mg/L	107	70.0	130	----
		selenium, total	7782-49-2	E420	0.415 mg/L	0.4 mg/L	104	70.0	130	----
		silicon, total	7440-21-3	E420	91.5 mg/L	100 mg/L	91.5	70.0	130	----
		silver, total	7440-22-4	E420	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		sodium, total	7440-23-5	E420	21.0 mg/L	20 mg/L	105	70.0	130	----
		strontium, total	7440-24-6	E420	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		sulfur, total	7704-34-9	E420	208 mg/L	200 mg/L	104	70.0	130	----
		tellurium, total	13494-80-9	E420	0.380 mg/L	0.4 mg/L	94.9	70.0	130	----
		thallium, total	7440-28-0	E420	0.0379 mg/L	0.04 mg/L	94.7	70.0	130	----
		thorium, total	7440-29-1	E420	0.214 mg/L	0.2 mg/L	107	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 422755) - continued										
FJ2200537-001	Anonymous	tin, total	7440-31-5	E420	0.190 mg/L	0.2 mg/L	94.8	70.0	130	----
		titanium, total	7440-32-6	E420	0.384 mg/L	0.4 mg/L	96.0	70.0	130	----
		tungsten, total	7440-33-7	E420	0.173 mg/L	0.2 mg/L	86.7	70.0	130	----
		uranium, total	7440-61-1	E420	0.0400 mg/L	0.04 mg/L	100.0	70.0	130	----
		vanadium, total	7440-62-2	E420	1.04 mg/L	1 mg/L	104	70.0	130	----
		zinc, total	7440-66-6	E420	3.99 mg/L	4 mg/L	99.8	70.0	130	----
		zirconium, total	7440-67-7	E420	0.386 mg/L	0.4 mg/L	96.6	70.0	130	----
Total Metals (QCLot: 425609)										
FJ2200569-002	Anonymous	mercury, total	7439-97-6	E508	0.0000929 mg/L	0.0001 mg/L	92.9	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 986006

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver
Work Order Reference
VA22A4191

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	BC Conservation Foundation
Contact:	Thea Rodger
Phone:	250-390-2525 ext 104
	Company address below will appear on the final report
Street:	#105-1885 Boxwood Rd.
City/Province:	Nanaimo BC
Postal Code:	V9S 5X9
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	tredger@bccf.com
Email 2	
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	llimenich@bccf.com
Email 2	

Turnaround Time (TAT) Requested
☐ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge 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 minimu
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Add may apply to rush requests on weekends, statutory holidays and non-r
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please

Project Information	
ALS Account # / Quote #:	VA2022-BCCF1000001
Job #:	1302084 EMOS
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): AH191

ALS Contact: Sneha

Sampler: PL / TR

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	Total metals	Hardness, Hg	Turbidity	TSS	SAMPLES ON HOLD	EXTENDED STORAGE REQ	SUSPECTED HAZARD (see
	SWMP-03 -1m	28-02-22	1030	Water	2	✓						
	SWMP-03 -5m	"	1035	"	3	✓		✓	✓			
	SWMP-03 -5m rep.	"	1037	"	2	✓						
	SWMP-03 -10 m	"	1041	"	2	✓						

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

Analysis Re

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	No field filtering done
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)							
Cooling Method:	☐ NONE	☐ ICE	☑ ICE PACKS	☐ FROZEN	☐ COOLING INITIATED		
Submission Comments identified on Sample Receipt Notification:	☐ YES	☐ NO					
Cooler Custody Seals Intact:	☐ YES	☐ N/A	Sample Custody Seals Intact:	☐ YES	☐ N/A		
INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4			

SHIPMENT RELEASE (client use)		
Released by: TR	Date: Feb. 28	Time: 1300

INITIAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)		
Received by: JC	Date: 1 Mar 2022	Time: 840am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALG 2020 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B0694**	Page	: 1 of 2
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 17-May-2022 08:45
PO	: ----	Date Analysis Commenced	: 18-May-2022
C-O-C number	: 20-986005	Issue Date	: 24-May-2022 15:18
Sampler	: TR/KS		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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*
Lindsay Gung	Supervisor - Water Chemistry	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*
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Client sample ID*	**SWMP03-1m**	**SWMP03-5m**	**SWMP03-10m #1**	**SWMP03-10m #2**	**----**
					Client sampling date / time	16-May-2022 11:45	16-May-2022 11:55	16-May-2022 12:10	16-May-2022 12:15	----
						VA22B0694-001	**VA22B0694-002**	**VA22B0694-003**	**VA22B0694-004**	**--------**
						Result	Result	Result	Result	----
Anions and Nutrients										
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0150	0.0134	0.0168	0.0178	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0117	0.0136	0.0167	0.0182	----
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg/L		8.18	15.2	11.6	11.6	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B0694**	Page	: 1 of 6
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 17-May-2022 08:45
PO	: ----	Issue Date	: 24-May-2022 15:18
C-O-C number	: 20-986005		
Sampler	: TR/KS		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) SWMP03-10m #1	E375-T	16-May-2022	18-May-2022	----	----		20-May-2022	28 days	4 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) SWMP03-10m #2	E375-T	16-May-2022	18-May-2022	----	----		20-May-2022	28 days	4 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) SWMP03-1m	E375-T	16-May-2022	18-May-2022	----	----		20-May-2022	28 days	4 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) SWMP03-5m	E375-T	16-May-2022	18-May-2022	----	----		20-May-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (lab preserved) SWMP03-10m #1	E372-U	16-May-2022	18-May-2022	3 days	2 days	✓	20-May-2022	28 days	2 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (lab preserved) SWMP03-10m #2	E372-U	16-May-2022	18-May-2022	3 days	2 days	✓	20-May-2022	28 days	2 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (lab preserved) SWMP03-1m	E372-U	16-May-2022	18-May-2022	3 days	2 days	✓	20-May-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (lab preserved)										
SWMP03-5m	E372-U	16-May-2022	18-May-2022	3 days	2 days	✓	20-May-2022	28 days	2 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP03-10m #1	E870	16-May-2022	18-May-2022	2 days	2 days	✓	18-May-2022	672 hrs	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP03-10m #2	E870	16-May-2022	18-May-2022	2 days	2 days	✓	18-May-2022	672 hrs	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP03-1m	E870	16-May-2022	18-May-2022	2 days	2 days	✓	18-May-2022	672 hrs	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP03-5m	E870	16-May-2022	18-May-2022	2 days	2 days	✓	18-May-2022	672 hrs	0 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)							
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	492188	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	492187	1	10	10.0	5.0	✓
Laboratory Control Samples (LCS)							
Chlorophyll-a by Fluorometry	E870	491664	1	6	16.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	492188	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	492187	1	10	10.0	5.0	✓
Method Blanks (MB)							
Chlorophyll-a by Fluorometry	E870	491664	1	6	16.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	492188	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	492187	1	10	10.0	5.0	✓
Matrix Spikes (MS)							
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	492188	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	492187	1	10	10.0	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
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Chlorophyll-a by Fluorometry	E870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Chlorophyll-a Extraction	EP870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22B0694**	Page	: 1 of 4
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 17-May-2022 08:45
PO	: ----	Date Analysis Commenced	: 18-May-2022
C-O-C number	: 20-986005	Issue Date	: 24-May-2022 15:17
Sampler	: TR/KS		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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*
Lindsay Gung	Supervisor - Water Chemistry	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*
Anions and Nutrients (QC Lot: 492187)											
VA22B0694-001	SWMP03-1m	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0150	0.0132	0.0018	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 492188)											
VA22B0641-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0052	0.0048	0.0005	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
Anions and Nutrients (QCLot: 492187)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 492188)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Plant Pigments (QCLot: 491664)						
chlorophyll a	479-61-8	E870	0.01	µg/L	<0.010	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 492187)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	97.8	80.0	120	----
Anions and Nutrients (QCLot: 492188)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	103	80.0	120	----
Plant Pigments (QCLot: 491664)									
chlorophyll a	479-61-8	E870	0.01	µg/L	5 µg/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: 492187)										
VA22B0694-002	SWMP03-5m	phosphorus, total	7723-14-0	E372-U	0.0498 mg/L	0.05 mg/L	99.7	70.0	130	----
Anions and Nutrients (QCLot: 492188)										
VA22B0658-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0514 mg/L	0.05 mg/L	103	70.0	130	----

ALS www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

COC Number: 20 - 986005

Page 1 of 1

Environmental Division
Vancouver
Work Order Reference
VA22B0694

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	BC Conservation Foundation
Contact:	Thea Rodgers
Phone:	250-390-3525 ext. 104
	Company address below will appear on the final report
Street:	#105-1885 Boxwood Rd.
City/Province:	NANAIMO BC
Postal Code:	V9T 0A6
Invoice To	Same as Report To [X] YES [ ] NO
	Copy of Invoice with Report [X] YES [ ] NO
Company:	
Contact:	

Reports / Recipients

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

Invoice Recipients

Select Invoice Distribution: [X] EMAIL [ ] MAIL [ ] FAX
Email 1 or Fax: trodgers@bccf.com
Email 2: llimerick@bccf.com

Turnaround Time (TAT) Requested

[X] Routine [R] if received by 3pm M-F - no surcharges apply
[ ] 4 day [P4] if received by 3pm M-F - 20% rush surcharge mini
[ ] 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 minin
[ ] Same day [E2] if received by 10am M-S - 200% rush surcharge. A may apply to rush requests on weekends, statutory holidays and non

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, pleas

Project Information

ALS Account # / Quote #: VA2022 BCCF 100 0001
Job #: 1303015 ENDS
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): B0694
ALS Contact: Sneha
Sampler: TRIKS

Analysis R — Indicate Filtered (F), Preserved (P) or Filtered

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	Total phosphorous	Dissolved phosphorous (P)	Chlorophyll-a	SAMPLES ON HOLD	EXTENDED STORAGE RE	SUSPECTED HAZARD (se
	SWMP03 - 1m	16-05-22	11:45	Water	[illegible]	✓	✓	✓			
	SWMP03 - 5m	16-05-22	11:55	"	[illegible]	✓	✓	✓			
	SWMP03 - 10m #1	16-05-22	12:00	"	[illegible]	✓	✓	✓			
	SWMP03 - 10m #2	16-05-22	12:15	"	[illegible]	✓	✓	✓			

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)

Please filter chlorophyll-a w/i 48 hours. TY.

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: [ ] NONE [ ] ICE [ ] ICE PACKS [ ] FROZEN [ ] COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: [ ] YES [ ] NO
Cooler Custody Seals Intact: [ ] YES [ ] N/A Sample Custody Seals Intact: [ ] YES [ ] N/A
INITIAL COOLER TEMPERATURES °C | FINAL COOLER TEMPERATURES °C: 5.6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: TRIKS	Date: 5/16/2022	Time: 1400	Received by:	Date:	Time:	Received by: VR	Date: 17/may/22	Time: 8:45

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

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B7778**	Page	: 1 of 5
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 03-Aug-2022 09:05
PO	: ----	Date Analysis Commenced	: 03-Aug-2022
C-O-C number	: 20-982083	Issue Date	: 16-Aug-2022 14:30
Sampler	: HT/AA		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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
Brieanna Allen	Production/Validation Manager	Microbiology, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Inorganics, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Woochan Song	Lab 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.

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

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

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

Unit	*Description*
mg/L	milligrams per litre
MPN/100mL	most probable number per 100 mL
NTU	nephelometric turbidity units

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-03-1M	SWMP-03-5M	SWMP-03-5M DUP	SWMP-03-10M	SWMP-04-1M
					Client sampling date / time	02-Aug-2022 10:37	02-Aug-2022 10:40	02-Aug-2022 10:40	02-Aug-2022 10:43	02-Aug-2022 10:53
						VA22B7778-001	VA22B7778-002	VA22B7778-003	VA22B7778-004	VA22B7778-005
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		45.8	43.0	44.6	46.5	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		----	<3.0	----	----	----
turbidity	----	E121	0.10	NTU		----	1.37	----	----	----
Microbiological Tests										
coliforms, total	----	E010	1	MPN/100mL		261	----	----	----	260
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL		<1	----	----	----	<1
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0265	0.0174	0.0184	0.0302	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00023	0.00018	0.00018	0.00030	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0178	0.0169	0.0164	0.0226	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.022	0.020	0.021	0.020	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	0.0000069	<0.0000050	<0.0000050	----
calcium, total	7440-70-2	E420	0.050	mg/L		15.5	14.6	15.2	15.9	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	0.00014	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00110	0.00102	0.00109	0.00079	----
iron, total	7439-89-6	E420	0.010	mg/L		0.042	0.061	0.066	2.06	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000206	0.000242	0.000254	0.000124	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.72	1.60	1.62	1.66	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0173	0.0242	0.0267	0.207	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000208	0.000188	0.000191	0.000153	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.350	0.321	0.329	0.373	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-03-1M	SWMP-03-5M	SWMP-03-5M DUP	SWMP-03-10M	SWMP-04-1M
					Client sampling date / time	02-Aug-2022 10:37	02-Aug-2022 10:40	02-Aug-2022 10:40	02-Aug-2022 10:43	02-Aug-2022 10:53
						VA22B7778-001	VA22B7778-002	VA22B7778-003	VA22B7778-004	VA22B7778-005
						Result	Result	Result	Result	Result
Total Metals										
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00051	0.00039	0.00044	0.00054	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000068	0.000076	0.000076	0.000084	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.76	3.12	3.12	3.92	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		7.56	7.17	7.15	7.48	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0488	0.0448	0.0452	0.0491	----
sulfur, total	7704-34-9	E420	0.50	mg/L		1.42	1.51	1.60	0.98	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00033	0.00050	0.00055	0.00094	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00058	<0.00050	<0.00050	0.00085	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0053	0.0035	0.0048	<0.0030	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----

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

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)				Client sample ID	**SWMP-06-1M**	**----**	**----**	**----**	**----**
				Client sampling date / time	02-Aug-2022 11:15	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**VA22B7778-006**	--------	--------	--------	--------
					Result	----	----	----	----
Microbiological Tests									
coliforms, total	----	E010	1	MPN/100mL	2420	----	----	----	----
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	1	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B7778**	Page	: 1 of 6
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 03-Aug-2022 09:05
PO	: ----	Issue Date	: 16-Aug-2022 14:30
C-O-C number	: 20-982083		
Sampler	: HT/AA		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP-06-1M	E010	02-Aug-2022	----	----	----		03-Aug-2022	30 hrs	24 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP-03-1M	E010	02-Aug-2022	----	----	----		03-Aug-2022	30 hrs	25 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP-04-1M	E010	02-Aug-2022	----	----	----		03-Aug-2022	30 hrs	25 hrs	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SWMP-03-5M	E160	02-Aug-2022	----	----	----		07-Aug-2022	7 days	5 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SWMP-03-5M	E121	02-Aug-2022	----	----	----		05-Aug-2022	3 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03-10M	E508	02-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03-1M	E508	02-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) SWMP-03-5M	E508	02-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) SWMP-03-5M DUP	E508	02-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-03-1M	E420	02-Aug-2022	12-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-03-5M	E420	02-Aug-2022	12-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-03-5M DUP	E420	02-Aug-2022	12-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-03-10M	E420	02-Aug-2022	12-Aug-2022	----	----		13-Aug-2022	180 days	11 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)							
Total Coliforms and E. coli (Enzyme Substrate)	E010	586922	2	20	10.0	10.0	✓
Total Mercury in Water by CVAAS	E508	598333	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	597719	2	38	5.2	5.0	✓
TSS by Gravimetry	E160	592053	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	590720	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Total Mercury in Water by CVAAS	E508	598333	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	597719	2	38	5.2	5.0	✓
TSS by Gravimetry	E160	592053	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	590720	1	19	5.2	5.0	✓
Method Blanks (MB)							
Total Coliforms and E. coli (Enzyme Substrate)	E010	586922	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	598333	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	597719	2	38	5.2	5.0	✓
TSS by Gravimetry	E160	592053	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	590720	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Total Mercury in Water by CVAAS	E508	598333	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	597719	2	38	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
Total Coliforms and E. coli (Enzyme Substrate)	E010 Vancouver - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ±0.5°C for either 18 or 24 hours (dependent on reagent used).
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22B7778**	Page	: 1 of 14
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 03-Aug-2022 09:05
PO	: ----	Date Analysis Commenced	: 03-Aug-2022
C-O-C number	: 20-982083	Issue Date	: 16-Aug-2022 14:30
Sampler	: HT/AA		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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
Brieanna Allen	Production/Validation Manager	Vancouver Microbiology, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Inorganics, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Woochan Song	Lab 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: 590720)											
KS2202780-004	Anonymous	turbidity	----	E121	0.10	NTU	0.16	0.19	0.03	Diff <2x LOR	----
Physical Tests (QC Lot: 592053)											
VA22B7778-002	SWMP-03-5M	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 586922)											
VA22B7782-004	Anonymous	coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
		coliforms, total	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
VA22B7813-001	Anonymous	coliforms, Escherichia coli [E. coli]	----	E010	10	MPN/100mL	<10	10	0	Diff <2x LOR	----
		coliforms, total	----	E010	10	MPN/100mL	3650	3080	17.2%	65%	----
Total Metals (QC Lot: 597719)											
FJ2202082-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0174	0.0162	0.0012	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00089	0.00086	0.00003	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00022	0.00022	0.000003	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.163	0.173	6.00%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.042	0.043	0.002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000807	0.0000940	15.2%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	64.6	66.1	2.31%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000029	0.000030	0.000002	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00058	0.00059	0.000008	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00073	0.00074	0.00001	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.012	0.011	0.0006	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0412	0.0424	2.78%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	27.7	28.0	1.10%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00253	0.00267	5.39%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00390	0.00384	1.54%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.0124	0.0125	0.885%	20%	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	2.13	2.16	1.42%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 597719) - continued											
FJ2202082-001	Anonymous	rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00239	0.00235	1.78%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00338	0.00348	2.97%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.07	1.09	2.01%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	16.6	16.8	1.10%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.316	0.312	1.30%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	42.0	42.9	2.14%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000019	0.000020	0.0000006	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00030	0.00036	0.00006	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00253	0.00256	1.13%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0034	0.0034	0.000008	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 598333)											
VA22B7752-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 599111)											
CG2210491-001	Anonymous	aluminum, total	7429-90-5	E420	0.0060	mg/L	<0.0060	<0.0060	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00020	mg/L	0.00244	0.00287	16.2%	20%	----
		arsenic, total	7440-38-2	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00020	mg/L	0.0202	0.0203	0.539%	20%	----
		beryllium, total	7440-41-7	E420	0.000040	mg/L	<0.040 µg/L	<0.000040	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.020	mg/L	0.099	0.116	0.017	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000100	mg/L	1.64 µg/L	0.00160	2.44%	20%	----
		calcium, total	7440-70-2	E420	0.100	mg/L	614	727	16.8%	20%	----
		cesium, total	7440-46-2	E420	0.000020	mg/L	0.000574	0.000669	15.4%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00020	mg/L	51.0 µg/L	0.0497	2.44%	20%	----
		copper, total	7440-50-8	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.020	mg/L	0.165	0.169	0.004	Diff <2x LOR	----
		lead, total	7439-92-1	E420	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*
Total Metals (QC Lot: 599111) - continued											
CG2210491-001	Anonymous	lithium, total	7439-93-2	E420	0.0020	mg/L	1.16	1.36	15.8%	20%	----
		magnesium, total	7439-95-4	E420	0.0100	mg/L	268	264	1.58%	20%	----
		manganese, total	7439-96-5	E420	0.00020	mg/L	0.307	0.300	2.25%	20%	----
		molybdenum, total	7439-98-7	E420	0.000100	mg/L	0.00459	0.00541	16.5%	20%	----
		nickel, total	7440-02-0	E420	0.00100	mg/L	0.472	0.459	2.94%	20%	----
		phosphorus, total	7723-14-0	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	16.6	16.4	1.10%	20%	----
		rubidium, total	7440-17-7	E420	0.00040	mg/L	0.0270	0.0269	0.308%	20%	----
		selenium, total	7782-49-2	E420	0.000100	mg/L	129 µg/L	0.127	1.67%	20%	----
		silicon, total	7440-21-3	E420	0.20	mg/L	2.85	2.84	0.319%	20%	----
		silver, total	7440-22-4	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.100	mg/L	35.7	34.6	3.31%	20%	----
		strontium, total	7440-24-6	E420	0.00040	mg/L	1.78	2.05	14.5%	20%	----
		sulfur, total	7704-34-9	E420	1.00	mg/L	460	460	0.000128%	20%	----
		tellurium, total	13494-80-9	E420	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000020	mg/L	0.000131	0.000159	0.000028	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000020	mg/L	0.0325	0.0386	17.2%	20%	----
		vanadium, total	7440-62-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0060	mg/L	0.124	0.123	1.21%	20%	----
		zirconium, total	7440-67-7	E420	0.00040	mg/L	<0.00040	<0.00040	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: 590720)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 592053)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Microbiological Tests (QCLot: 586922)						
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
coliforms, total	----	E010	1	MPN/100mL	<1	----
Total Metals (QCLot: 597719)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 597719) - continued						
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 598333)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 599111)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 599111) - continued						
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 590720)									
turbidity	----	E121	0.1	NTU	200 NTU	98.5	85.0	115	----
Physical Tests (QCLot: 592053)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	86.0	85.0	115	----
Total Metals (QCLot: 597719)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	101	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	98.8	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	95.9	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	98.1	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	94.7	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.8	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	95.6	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	104	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	97.3	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	97.7	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.0	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	101	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.2	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	95.4	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.8	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.6	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.3	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	113	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	101	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	94.0	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	96.7	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	99.9	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	92.9	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 597719) - continued									
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	98.7	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	97.6	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	93.5	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.1	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	101	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	99.2	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	95.8	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	96.4	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	100.0	80.0	120	----
Total Metals (QCLot: 598333)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
Total Metals (QCLot: 599111)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.4	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	99.8	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	99.4	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	99.3	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	99.6	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.9	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.7	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	103	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.4	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	103	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	98.5	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.9	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	106	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	110	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 599111) - continued									
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	101	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	96.4	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	98.6	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	103	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	98.9	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	103	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	99.8	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	106	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	106	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	93.5	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	99.6	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
Total Metals (QCLot: 597719)										
FJ2202082-002	Anonymous	aluminum, total	7429-90-5	E420	0.203 mg/L	0.2 mg/L	102	70.0	130	----
		antimony, total	7440-36-0	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0374 mg/L	0.04 mg/L	93.5	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00917 mg/L	0.01 mg/L	91.7	70.0	130	----
		boron, total	7440-42-8	E420	0.091 mg/L	0.1 mg/L	91.4	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00402 mg/L	0.004 mg/L	100	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		chromium, total	7440-47-3	E420	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		copper, total	7440-50-8	E420	0.0186 mg/L	0.02 mg/L	93.1	70.0	130	----
		iron, total	7439-89-6	E420	1.91 mg/L	2 mg/L	95.7	70.0	130	----
		lead, total	7439-92-1	E420	0.0184 mg/L	0.02 mg/L	92.2	70.0	130	----
		lithium, total	7439-93-2	E420	0.0893 mg/L	0.1 mg/L	89.3	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		nickel, total	7440-02-0	E420	0.0369 mg/L	0.04 mg/L	92.4	70.0	130	----
		phosphorus, total	7723-14-0	E420	11.3 mg/L	10 mg/L	113	70.0	130	----
		potassium, total	7440-09-7	E420	3.76 mg/L	4 mg/L	93.9	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		selenium, total	7782-49-2	E420	0.0421 mg/L	0.04 mg/L	105	70.0	130	----
		silicon, total	7440-21-3	E420	9.55 mg/L	10 mg/L	95.5	70.0	130	----
		silver, total	7440-22-4	E420	0.00387 mg/L	0.004 mg/L	96.7	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		thallium, total	7440-28-0	E420	0.00368 mg/L	0.004 mg/L	91.9	70.0	130	----
		thorium, total	7440-29-1	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		tin, total	7440-31-5	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 597719) - continued										
FJ2202082-002	Anonymous	titanium, total	7440-32-6	E420	0.0423 mg/L	0.04 mg/L	106	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		uranium, total	7440-61-1	E420	0.00378 mg/L	0.004 mg/L	94.6	70.0	130	----
		vanadium, total	7440-62-2	E420	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		zinc, total	7440-66-6	E420	0.379 mg/L	0.4 mg/L	94.8	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0406 mg/L	0.04 mg/L	101	70.0	130	----
Total Metals (QCLot: 598333)										
VA22B7752-002	Anonymous	mercury, total	7439-97-6	E508	0.000104 mg/L	0.0001 mg/L	104	70.0	130	----
Total Metals (QCLot: 599111)										
CG2210491-002	Anonymous	aluminum, total	7429-90-5	E420	0.995 mg/L	1 mg/L	99.5	70.0	130	----
		antimony, total	7440-36-0	E420	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		arsenic, total	7440-38-2	E420	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		barium, total	7440-39-3	E420	0.0964 mg/L	0.1 mg/L	96.4	70.0	130	----
		beryllium, total	7440-41-7	E420	0.187 mg/L	0.2 mg/L	93.4	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0451 mg/L	0.05 mg/L	90.2	70.0	130	----
		boron, total	7440-42-8	E420	0.466 mg/L	0.5 mg/L	93.2	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0500 mg/L	0.05 mg/L	100.0	70.0	130	----
		chromium, total	7440-47-3	E420	0.195 mg/L	0.2 mg/L	97.5	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0891 mg/L	0.1 mg/L	89.1	70.0	130	----
		copper, total	7440-50-8	E420	0.0902 mg/L	0.1 mg/L	90.2	70.0	130	----
		iron, total	7439-89-6	E420	9.37 mg/L	10 mg/L	93.7	70.0	130	----
		lead, total	7439-92-1	E420	0.0931 mg/L	0.1 mg/L	93.1	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	0.5 mg/L	ND	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	5 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.108 mg/L	0.1 mg/L	108	70.0	130	----
		nickel, total	7440-02-0	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		phosphorus, total	7723-14-0	E420	54.3 mg/L	50 mg/L	108	70.0	130	----
		potassium, total	7440-09-7	E420	18.4 mg/L	20 mg/L	92.3	70.0	130	----
		rubidium, total	7440-17-7	E420	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		selenium, total	7782-49-2	E420	0.190 mg/L	0.2 mg/L	94.8	70.0	130	----
		silicon, total	7440-21-3	E420	50.4 mg/L	50 mg/L	101	70.0	130	----
		silver, total	7440-22-4	E420	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	10 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 599111) - continued										
CG2210491-002	Anonymous	strontium, total	7440-24-6	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	100 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.196 mg/L	0.2 mg/L	97.9	70.0	130	----
		thallium, total	7440-28-0	E420	0.0186 mg/L	0.02 mg/L	93.1	70.0	130	----
		thorium, total	7440-29-1	E420	0.0977 mg/L	0.1 mg/L	97.7	70.0	130	----
		tin, total	7440-31-5	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		titanium, total	7440-32-6	E420	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		tungsten, total	7440-33-7	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.511 mg/L	0.5 mg/L	102	70.0	130	----
		zinc, total	7440-66-6	E420	1.68 mg/L	2 mg/L	84.1	70.0	130	----
		zirconium, total	7440-67-7	E420	0.201 mg/L	0.2 mg/L	100	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 982083

Canada Toll Free: 1 800 668 9878

Page of

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Report To	Contact and company name below will appear on the final report
Company:	BC Conservation Foundation
Contact:	Thea Rodgers
Phone:	(250) 390-2525 ext. 104
	Company address below will appear on the final report
Street:	#105-1885 Boxwood Road
City/Province:	Nanaimo, BC
Postal Code:	V9T 0A6

Invoice To		
	Same as Report To	[X] YES [ ] NO
	Copy of Invoice with Report	[X] YES [ ] NO
Company:		
Contact:		

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

Invoice Recipients	
Select Invoice Distribution:	[X] EMAIL [ ] MAIL [ ] FAX
Email 1 or Fax	trodgers@bccf.com
Email 2	llinerick@bccf.com

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA2022 BCCF 1000001	AFE/Cost Center:	PO#:
Job #:	1303015 ENOS	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	7778	ALS Contact: Snena	Sampler: HT/AA

Turnaround Time (TAT) Requested

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

AFFIX ALS BARCODE LABEL HERE (ALS use only)

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.

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	Total metals	Hardness, Hg	Turbidity	TSS	Ecoli	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	SWMP-03-1m	02-Aug-22	10:37	Water	3	✓				✓			
	SWMP-03-5m		10:40		3	✓		✓	✓				
	SWMP-03-5m dup.		10:40		2	✓							
	SWMP-03-10m		10:43		2	✓							
	SWMP-04-1m		10:53		1					✓			
	SWMP-06-1m		11:15		1					✓			

Environmental Division
Vancouver
Work Order Reference
VA22B7778

Telephone : +1 604 253 4188

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	

SAMPLE RECEIPT DETAILS

Cooling Method: [ ] NONE [ ] ICE [ ] ICE PACKS [ ] FROZEN [ ] COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: [ ] YES [ ] NO

Cooler Custody Seals Intact: [ ] YES [ ] N/A Sample Custody Seals Intact: [ ] YES [ ] N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
					12		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: HT	Date: Aug 2/22	Time: 1300	Received by:	Date:	Time:	Received by: JC	Date: 3 Aug 22	Time: 905am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

White Paper Co. 604 951-3900

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B8451**	Page	: 1 of 4
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 10-Aug-2022 09:00
PO	: ----	Date Analysis Commenced	: 10-Aug-2022
C-O-C number	: 20-992050	Issue Date	: 17-Aug-2022 16:52
Sampler	: TR/AB		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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*
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Microbiology, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Microbiology, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Woochan Song	Lab 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*
mg/L	milligrams per litre
MPN/100mL	most probable number per 100 mL
NTU	nephelometric turbidity units

<: less than.

>: greater than.

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

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

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

Workorder Comments

Samples received with temperature >10 °C.

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP03-1m	SWMP03-5m	SWMP03-10m	SWMP03-10m duplicate	SWMP04-1m
					Client sampling date / time	09-Aug-2022 10:15	09-Aug-2022 10:22	09-Aug-2022 10:30	09-Aug-2022 10:30	09-Aug-2022 10:45
						VA22B8451-001	VA22B8451-002	VA22B8451-003	VA22B8451-004	VA22B8451-005
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		48.3	45.7	47.7	46.8	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		----	3.5	----	----	----
turbidity	----	E121	0.10	NTU		----	1.39	----	----	----
Microbiological Tests										
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL		1	----	----	----	1
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0318	0.0250	0.0440	0.0447	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00025	0.00018	0.00032	0.00029	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0185	0.0168	0.0237	0.0230	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.024	0.021	0.020	0.020	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
calcium, total	7440-70-2	E420	0.050	mg/L		16.5	15.6	16.4	16.1	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	0.00021	0.00021	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00174	0.00130	0.00098	0.00092	----
iron, total	7439-89-6	E420	0.010	mg/L		0.062	0.079	2.96	2.97	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000892	0.00137	0.000235	0.000238	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.73	1.65	1.64	1.60	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0304	0.0397	0.304	0.303	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000198	0.000195	0.000134	0.000126	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.333	0.326	0.382	0.378	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00052	0.00045	0.00050	0.00050	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP03-1m	SWMP03-5m	SWMP03-10m	SWMP03-10m duplicate	SWMP04-1m
					Client sampling date / time	09-Aug-2022 10:15	09-Aug-2022 10:22	09-Aug-2022 10:30	09-Aug-2022 10:30	09-Aug-2022 10:45
						VA22B8451-001	VA22B8451-002	VA22B8451-003	VA22B8451-004	VA22B8451-005
						Result	Result	Result	Result	Result
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000082	0.000083	0.000092	0.000068	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.76	3.01	4.16	4.19	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		7.77	7.44	7.31	7.24	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0493	0.0484	0.0500	0.0482	----
sulfur, total	7704-34-9	E420	0.50	mg/L		1.62	1.67	0.60	0.72	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00059	0.00092	0.00110	0.00124	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00064	<0.00050	0.00111	0.00110	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0263	0.0067	0.0038	<0.0030	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP06-1m	----	----	----	----
					Client sampling date / time	09-Aug-2022 11:00	----	----	----	----
						VA22B8451-006	--------	--------	--------	--------
						Result	----	----	----	----
Microbiological Tests										
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL		2	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B8451**	Page	: 1 of 6
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 10-Aug-2022 09:00
PO	: ----	Issue Date	: 17-Aug-2022 16:52
C-O-C number	: 20-992050		
Sampler	: TR/AB		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP06-1m	E010	09-Aug-2022	----	----	----		10-Aug-2022	30 hrs	25 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP03-1m	E010	09-Aug-2022	----	----	----		10-Aug-2022	30 hrs	26 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP04-1m	E010	09-Aug-2022	----	----	----		10-Aug-2022	30 hrs	26 hrs	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SWMP03-5m	E160	09-Aug-2022	----	----	----		15-Aug-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SWMP03-5m	E121	09-Aug-2022	----	----	----		12-Aug-2022	3 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-10m	E508	09-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-10m duplicate	E508	09-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) SWMP03-1m	E508	09-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) SWMP03-5m	E508	09-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP03-10m	E420	09-Aug-2022	16-Aug-2022	----	----		17-Aug-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP03-10m duplicate	E420	09-Aug-2022	16-Aug-2022	----	----		17-Aug-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP03-1m	E420	09-Aug-2022	16-Aug-2022	----	----		17-Aug-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP03-5m	E420	09-Aug-2022	16-Aug-2022	----	----		17-Aug-2022	180 days	8 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)							
Total Coliforms and E. coli (Enzyme Substrate)	E010	596499	2	18	11.1	10.0	✓
Total Mercury in Water by CVAAS	E508	605765	2	40	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	600764	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	602757	1	18	5.5	5.0	✓
Turbidity by Nephelometry	E121	599884	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Total Mercury in Water by CVAAS	E508	605765	2	40	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	600764	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	602757	1	18	5.5	5.0	✓
Turbidity by Nephelometry	E121	599884	1	20	5.0	5.0	✓
Method Blanks (MB)							
Total Coliforms and E. coli (Enzyme Substrate)	E010	596499	1	18	5.5	5.0	✓
Total Mercury in Water by CVAAS	E508	605765	2	40	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	600764	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	602757	1	18	5.5	5.0	✓
Turbidity by Nephelometry	E121	599884	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Total Mercury in Water by CVAAS	E508	605765	2	40	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	600764	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
Total Coliforms and E. coli (Enzyme Substrate)	E010 Vancouver - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ±0.5°C for either 18 or 24 hours (dependent on reagent used).
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

QUALITY CONTROL REPORT

Work Order	: **VA22B8451**	Page	: 1 of 10
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 10-Aug-2022 09:00
PO	: ----	Date Analysis Commenced	: 10-Aug-2022
C-O-C number	: 20-992050	Issue Date	: 17-Aug-2022 16:52
Sampler	: TR/AB		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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*
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Microbiology, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Microbiology, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Woochan Song	Lab 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: 599884)											
FJ2202111-001	Anonymous	turbidity	----	E121	0.10	NTU	16.3	15.5	4.90%	15%	----
Physical Tests (QC Lot: 602757)											
FJ2202116-004	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	3.9	3.1	0.8	Diff <2x LOR	----
Microbiological Tests (QC Lot: 596499)											
VA22B8451-001	SWMP03-1m	coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	1	<1	0	Diff <2x LOR	----
VA22B8470-002	Anonymous	coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	5	3	52.4%	65%	----
Total Metals (QC Lot: 600764)											
VA22B8451-001	SWMP03-1m	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0318	0.0346	8.17%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00025	0.00022	0.00002	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0185	0.0184	0.485%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.024	0.024	0.0002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	16.5	15.9	3.63%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00174	0.00171	0.00003	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.062	0.062	0.0004	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000892	0.000860	3.58%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	1.73	1.72	0.768%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0304	0.0301	1.04%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000198	0.000208	0.000010	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.333	0.329	0.004	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00052	0.00049	0.00002	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000082	0.000075	0.000006	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 600764) - continued											
VA22B8451-001	SWMP03-1m	silicon, total	7440-21-3	E420	0.10	mg/L	2.76	2.64	4.28%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	7.77	7.65	1.58%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0493	0.0490	0.631%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	1.62	1.43	0.18	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00059	0.00048	0.00010	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00064	0.00060	0.00003	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0263	0.0254	0.0009	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 605765)											
VA22B7816-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 605766)											
VA22B8451-002	SWMP03-5m	mercury, total	7439-97-6	E508	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: 599884)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 602757)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Microbiological Tests (QCLot: 596499)						
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Total Metals (QCLot: 600764)						
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 600764) - continued						
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 605765)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 605766)						
mercury, total	7439-97-6	E508	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	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 599884)									
turbidity	----	E121	0.1	NTU	200 NTU	97.5	85.0	115	----
Physical Tests (QCLot: 602757)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	95.5	85.0	115	----
Total Metals (QCLot: 600764)									
aluminum, total	7429-90-5	E420	----	mg/L	2 mg/L	103	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	96.6	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	97.5	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.6	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	94.1	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.6	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.2	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	100	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	96.1	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	96.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	96.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	101	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.4	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.5	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.3	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.4	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.9	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.2	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	92.2	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	99.1	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	96.7	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	90.6	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	94.6	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 600764) - continued									
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	93.6	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	102	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	95.5	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	95.6	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.3	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	95.6	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	99.0	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	95.4	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	97.2	80.0	120	----
Total Metals (QCLot: 605765)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	100	80.0	120	----
Total Metals (QCLot: 605766)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	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
Total Metals (QCLot: 600764)										
VA22B8451-002	SWMP03-5m	aluminum, total	7429-90-5	E420	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		antimony, total	7440-36-0	E420	0.0196 mg/L	0.02 mg/L	98.1	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		barium, total	7440-39-3	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00991 mg/L	0.01 mg/L	99.1	70.0	130	----
		boron, total	7440-42-8	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00397 mg/L	0.004 mg/L	99.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0107 mg/L	0.01 mg/L	107	70.0	130	----
		chromium, total	7440-47-3	E420	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0199 mg/L	0.02 mg/L	99.5	70.0	130	----
		copper, total	7440-50-8	E420	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		iron, total	7439-89-6	E420	1.93 mg/L	2 mg/L	96.5	70.0	130	----
		lead, total	7439-92-1	E420	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		lithium, total	7439-93-2	E420	0.0995 mg/L	0.1 mg/L	99.5	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0207 mg/L	0.02 mg/L	103	70.0	130	----
		nickel, total	7440-02-0	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.30 mg/L	10 mg/L	93.0	70.0	130	----
		potassium, total	7440-09-7	E420	3.98 mg/L	4 mg/L	99.6	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0196 mg/L	0.02 mg/L	98.1	70.0	130	----
		selenium, total	7782-49-2	E420	0.0397 mg/L	0.04 mg/L	99.3	70.0	130	----
		silicon, total	7440-21-3	E420	9.62 mg/L	10 mg/L	96.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00398 mg/L	0.004 mg/L	99.6	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	20.0 mg/L	20 mg/L	100.0	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0382 mg/L	0.04 mg/L	95.6	70.0	130	----
		thallium, total	7440-28-0	E420	0.00384 mg/L	0.004 mg/L	95.9	70.0	130	----
		thorium, total	7440-29-1	E420	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		tin, total	7440-31-5	E420	0.0196 mg/L	0.02 mg/L	98.2	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
Total Metals (QCLot: 600764) - continued										
VA22B8451-002	SWMP03-5m	titanium, total	7440-32-6	E420	0.0402 mg/L	0.04 mg/L	101	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		uranium, total	7440-61-1	E420	0.00384 mg/L	0.004 mg/L	96.0	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0989 mg/L	0.1 mg/L	98.9	70.0	130	----
		zinc, total	7440-66-6	E420	0.391 mg/L	0.4 mg/L	97.7	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0414 mg/L	0.04 mg/L	103	70.0	130	----
Total Metals (QCLot: 605765)										
VA22B7816-002	Anonymous	mercury, total	7439-97-6	E508	0.000101 mg/L	0.0001 mg/L	101	70.0	130	----
Total Metals (QCLot: 605766)										
VA22B8451-003	SWMP03-10m	mercury, total	7439-97-6	E508	0.0000988 mg/L	0.0001 mg/L	98.8	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 992050

Canada Toll Free: 1 800 668 9878

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www.alsglobal.com

Environmental Division Vancouver
Work Order Reference
VA22B8451

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	BC Conservation Foundation
Contact:	Inga Rodgers
Phone:	250 390 2825 ext. 104
	Company address below will appear on the final report
Street:	#105 - 1885 Boxwood Rd.
City/Province:	Nanaimo BC
Postal Code:	V9T 0A6
Invoice To	Same as Report To [X] YES [ ] NO
	Copy of Invoice with Report [X] YES [ ] NO
Company:	
Contact:	

Reports / Recipients

Select Report Format: [X] PDF [X] EXCEL [ ] EDD (DIGITAL)
Merge QC/QCI Reports with COA [X] 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: trodgers@bcef.com
Email 2:
Email 3:

Invoice Recipients

Select Invoice Distribution: [X] EMAIL [ ] MAIL [ ] FAX
Email 1 or Fax: trodgers@bcef.com
Email 2: llimerick@bcef.com

Turnaround Time (TAT) Requested

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

Date and Time Required for all E&P TATs:

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

Project Information

ALS Account # / Quote #: VA 2022 BCCF100 0001
Job #: 130315 EMOS
PO / AFE:
LSD:
ALS Lab Work Order # (ALS use only): VA22B8451

Oil and Gas Required Fields (client use)

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

ALS Contact: Sneha Sampler: TR / AB (Pacific)

Analysis Requested

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Total metals	Hardness, Hg	TSS + Turbidity	E. coli (P)	SAMPLES ON HOLD	EXTENDED STORAGE REQ	SUSPECTED HAZARD (see)
1	SWMP 03 - 1m	09/08/22	10:15	Water	3	✓	✓		✓			
2	SWMP 03 - 5m	"	10:22	"	3	✓	✓	✓				
3	SWMP 03 - 10m	"	10:30	"	2	✓	✓					
4	SWMP 03 - 10m duplicate	"	10:30	"	2	✓	✓					
5	SWMP 04 - 1m	"	10:45	"	1				✓			
6	SWMP 06 - 1m	"	11:00	"	1				✓			

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)

Total metals. Not filt./pres. in field.

SAMPLE RECEIPT DETAILS (ALS use only)

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				1.1			

SHIPMENT RELEASE (client use)

Released by: TR / AB Date: 09-08-22 Time: 1230

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: 8/10/22 Time: 9:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B8970**	Page	: 1 of 8
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 16-Aug-2022 09:10
PO	: ----	Date Analysis Commenced	: 16-Aug-2022
C-O-C number	: 20-982084	Issue Date	: 25-Aug-2022 07:07
Sampler	: A B, T R		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 9		
No. of samples analysed	: 9		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Microbiology, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	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 Unit
%	percent
µg/L	micrograms per litre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
MPN/100mL	most probable number per 100 mL
NTU	nephelometric turbidity units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLHM	*Detection Limit Adjusted: Sample has high moisture content.*
HTD	*Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: SWMP03	SWMP04	SWMP06	----	----
					Client sampling date / time: 15-Aug-2022 13:00	15-Aug-2022 13:30	15-Aug-2022 13:50	----	----
					VA22B8970-006	VA22B8970-007	VA22B8970-008	--------	--------
					Result	Result	Result	----	----
Physical Tests									
moisture	----	E144	0.25	%	94.9	58.7	35.9	----	----
Polycyclic Aromatic Hydrocarbons									
acenaphthene	83-32-9	E641A	0.050	mg/kg	<0.164 DLHM	<0.050	<0.050	----	----
acenaphthylene	208-96-8	E641A	0.050	mg/kg	<0.164 DLHM	<0.050	<0.050	----	----
acridine	260-94-6	E641A	0.050	mg/kg	<0.164 DLHM	<0.050	<0.050	----	----
anthracene	120-12-7	E641A	0.050	mg/kg	<0.164 DLHM	<0.050	<0.050	----	----
benz(a)anthracene	56-55-3	E641A	0.050	mg/kg	0.168	<0.050	<0.050	----	----
benzo(a)pyrene	50-32-8	E641A	0.050	mg/kg	0.268	<0.050	<0.050	----	----
benzo(b+j)fluoranthene	n/a	E641A	0.050	mg/kg	0.575	<0.050	<0.050	----	----
benzo(b+j+k)fluoranthene	n/a	E641A	0.075	mg/kg	0.575	<0.075	<0.075	----	----
benzo(g,h,i)perylene	191-24-2	E641A	0.050	mg/kg	0.568	<0.050	<0.050	----	----
benzo(k)fluoranthene	207-08-9	E641A	0.050	mg/kg	<0.164 DLHM	<0.050	<0.050	----	----
chrysene	218-01-9	E641A	0.050	mg/kg	0.187	<0.050	<0.050	----	----
dibenz(a,h)anthracene	53-70-3	E641A	0.050	mg/kg	<0.164 DLHM	<0.050	<0.050	----	----
fluoranthene	206-44-0	E641A	0.050	mg/kg	0.480	<0.050	<0.050	----	----
fluorene	86-73-7	E641A	0.050	mg/kg	<0.164 DLHM	<0.050	<0.050	----	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.050	mg/kg	0.537	<0.050	<0.050	----	----
methylnaphthalene, 1-	90-12-0	E641A	0.050	mg/kg	<0.164 DLHM	<0.050	<0.050	----	----
methylnaphthalene, 1+2-	----	E641A	0.075	mg/kg	<0.232	<0.075	<0.075	----	----
methylnaphthalene, 2-	91-57-6	E641A	0.050	mg/kg	<0.164 DLHM	<0.050	<0.050	----	----
naphthalene	91-20-3	E641A	0.050	mg/kg	<0.164 DLHM	<0.050	<0.050	----	----
phenanthrene	85-01-8	E641A	0.050	mg/kg	0.196	<0.050	<0.050	----	----
pyrene	129-00-0	E641A	0.050	mg/kg	0.434	<0.050	<0.050	----	----
quinoline	91-22-5	E641A	0.050	mg/kg	<0.164 DLHM	<0.050	<0.050	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.065	mg/kg	0.494	<0.065	<0.065	----	----
IACR (CCME)	----	E641A	0.60	-	6.07	<0.60	<0.60	----	----
IACR AB (coarse)	----	E641A	0.10	-	0.22	<0.10	<0.10	----	----
IACR AB (fine)	----	E641A	0.10	-	0.42	<0.10	<0.10	----	----
PAHs, total (BC Sched 3.4)	n/a	E641A	0.20	mg/kg	1.73	<0.20	<0.20	----	----
PAHs, total (EPA 16)	n/a	E641A	0.20	mg/kg	3.41	<0.20	<0.20	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	SWMP03	SWMP04	SWMP06	----	----
					Client sampling date / time	15-Aug-2022 13:00	15-Aug-2022 13:30	15-Aug-2022 13:50	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22B8970-006	VA22B8970-007	VA22B8970-008	--------	--------
						Result	Result	Result	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
acridine-d9	34749-75-2	E641A	0.1	%		86.5	88.9	83.5	----	----
chrysene-d12	1719-03-5	E641A	0.1	%		88.9	89.5	89.0	----	----
naphthalene-d8	1146-65-2	E641A	0.1	%		80.1	81.5	78.3	----	----
phenanthrene-d10	1517-22-2	E641A	0.1	%		82.6	83.4	79.8	----	----

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP03-1m	SWMP03-5m	SWMP03-10m	SWMP04-1m	SWMP06-1m
					Client sampling date / time	15-Aug-2022 11:30	15-Aug-2022 11:35	15-Aug-2022 11:55	15-Aug-2022 13:15	15-Aug-2022 13:46
						VA22B8970-001	VA22B8970-002	VA22B8970-003	VA22B8970-004	VA22B8970-005
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		48.6	45.4	46.8	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		<3.0	3.2	4.0	----	----
turbidity	----	E121	0.10	NTU		1.11	1.20	3.08	----	----
Anions and Nutrients										
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010 HTD	0.0012	<0.0010	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0091	0.0180	0.0333	----	----
Microbiological Tests										
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL		2	----	----	<1	1
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0269	0.0165	0.0338	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00025	0.00017	0.00033	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0190	0.0182	0.0250	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.025	0.022	0.021	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		16.6	15.5	16.1	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	0.00022	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00168	0.00134	0.00087	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.053	0.064	2.81	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000942	0.000390	0.000122	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.74	1.63	1.60	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0280	0.0368	0.340	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000217	0.000191	0.000129	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP03-1m	SWMP03-5m	SWMP03-10m	SWMP04-1m	SWMP06-1m
					Client sampling date / time	15-Aug-2022 11:30	15-Aug-2022 11:35	15-Aug-2022 11:55	15-Aug-2022 13:15	15-Aug-2022 13:46
						VA22B8970-001	VA22B8970-002	VA22B8970-003	VA22B8970-004	VA22B8970-005
						Result	Result	Result	Result	Result
Total Metals										
potassium, total	7440-09-7	E420	0.050	mg/L		0.350	0.334	0.391	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00047	0.00037	0.00052	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000086	0.000078	0.000094	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.77	3.12	4.12	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		8.26	7.72	7.53	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0502	0.0465	0.0469	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		1.64	1.87	0.90	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00037	0.00044	0.00094	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00055	<0.00050	0.00105	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0069	0.0043	<0.0030	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	----
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg/L		5.78	10.0	10.4	----	----

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

Analytical Results

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

					Client sample ID	SWMP03-5m Duplicate	----	----	----	----
					Client sampling date / time	15-Aug-2022 11:45	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22B8970-009	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		46.0	----	----	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		<3.0	----	----	----	----
turbidity	----	E121	0.10	NTU		1.26	----	----	----	----
Anions and Nutrients										
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0011	----	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0188	----	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0178	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00021	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0184	----	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.022	----	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		15.7	----	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	----	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	----	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00205	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.063	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000789	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.65	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0363	----	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000213	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	----	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.331	----	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00039	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	SWMP03-5m Duplicate	----	----	----	----
					Client sampling date / time	15-Aug-2022 11:45	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22B8970-009	--------	--------	--------	--------
						Result	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000092	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		3.02	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	----	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		7.76	----	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0464	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		1.64	----	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	----	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00046	----	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0069	----	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	----	----	----	----
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg/L		10.4	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B8970**	Page	: 1 of 11
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 16-Aug-2022 09:10
PO	: ----	Issue Date	: 25-Aug-2022 07:07
C-O-C number	: 20-982084		
Sampler	: A B, T R		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 9		
No. of samples analysed	: 9		

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)

- No Analysis Holding Time Outliers exist.

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: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
SWMP03	E144	15-Aug-2022	----	----	----		23-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
SWMP04	E144	15-Aug-2022	----	----	----		23-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
SWMP06	E144	15-Aug-2022	----	----	----		23-Aug-2022	----	----	
Polycyclic Aromatic Hydrocarbons : PAHs by Hex:Ace GC-MS										
Glass soil jar/Teflon lined cap										
SWMP03	E641A	15-Aug-2022	23-Aug-2022	14 days	8 days	✓	24-Aug-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hex:Ace GC-MS										
Glass soil jar/Teflon lined cap										
SWMP04	E641A	15-Aug-2022	23-Aug-2022	14 days	8 days	✓	24-Aug-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hex:Ace GC-MS										
Glass soil jar/Teflon lined cap										
SWMP06	E641A	15-Aug-2022	23-Aug-2022	14 days	8 days	✓	24-Aug-2022	40 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE SWMP03-10m	E378-U	15-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE SWMP03-1m	E378-U	15-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE SWMP03-5m	E378-U	15-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE SWMP03-5m Duplicate	E378-U	15-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SWMP03-10m	E372-U	15-Aug-2022	23-Aug-2022	----	----		23-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SWMP03-1m	E372-U	15-Aug-2022	23-Aug-2022	----	----		23-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SWMP03-5m	E372-U	15-Aug-2022	23-Aug-2022	----	----		23-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SWMP03-5m Duplicate	E372-U	15-Aug-2022	23-Aug-2022	----	----		23-Aug-2022	28 days	8 days	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) SWMP04-1m	E010	15-Aug-2022	----	----	----		16-Aug-2022	30 hrs	24 hrs	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) SWMP06-1m	E010	15-Aug-2022	----	----	----		16-Aug-2022	30 hrs	24 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) SWMP03-1m	E010	15-Aug-2022	----	----	----		16-Aug-2022	30 hrs	26 hrs	✓
Physical Tests : TSS by Gravimetry										
HDPE SWMP03-10m	E160	15-Aug-2022	----	----	----		19-Aug-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SWMP03-1m	E160	15-Aug-2022	----	----	----		19-Aug-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SWMP03-5m	E160	15-Aug-2022	----	----	----		19-Aug-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SWMP03-5m Duplicate	E160	15-Aug-2022	----	----	----		19-Aug-2022	7 days	4 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE SWMP03-10m	E121	15-Aug-2022	----	----	----		16-Aug-2022	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE SWMP03-1m	E121	15-Aug-2022	----	----	----		16-Aug-2022	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE SWMP03-5m	E121	15-Aug-2022	----	----	----		16-Aug-2022	3 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
SWMP03-5m Duplicate	E121	15-Aug-2022	----	----	----		16-Aug-2022	3 days	1 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP03-10m	E870	15-Aug-2022	16-Aug-2022	2 days	1 days	✓	17-Aug-2022	672 hrs	1 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP03-1m	E870	15-Aug-2022	16-Aug-2022	2 days	1 days	✓	17-Aug-2022	672 hrs	1 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP03-5m	E870	15-Aug-2022	16-Aug-2022	2 days	1 days	✓	17-Aug-2022	672 hrs	1 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
SWMP03-5m Duplicate	E870	15-Aug-2022	16-Aug-2022	2 days	1 days	✓	17-Aug-2022	672 hrs	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-10m	E508	15-Aug-2022	22-Aug-2022	----	----		22-Aug-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-1m	E508	15-Aug-2022	22-Aug-2022	----	----		22-Aug-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-5m	E508	15-Aug-2022	22-Aug-2022	----	----		22-Aug-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP03-5m Duplicate	E508	15-Aug-2022	22-Aug-2022	----	----		22-Aug-2022	28 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP03-10m	E420	15-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP03-1m	E420	15-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP03-5m	E420	15-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP03-5m Duplicate	E420	15-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	4 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: **Soil/Solid**

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)							
Moisture Content by Gravimetry	E144	614229	1	8	12.5	5.0	✓
PAHs by Hex:Ace GC-MS	E641A	614227	1	3	33.3	5.0	✓
Laboratory Control Samples (LCS)							
Moisture Content by Gravimetry	E144	614229	1	8	12.5	5.0	✓
PAHs by Hex:Ace GC-MS	E641A	614227	1	3	33.3	5.0	✓
Method Blanks (MB)							
Moisture Content by Gravimetry	E144	614229	1	8	12.5	5.0	✓
PAHs by Hex:Ace GC-MS	E641A	614227	1	3	33.3	5.0	✓
Matrix Spikes (MS)							
PAHs by Hex:Ace GC-MS	E641A	614227	1	3	33.3	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	607710	1	5	20.0	5.0	✓
Total Coliforms and E. coli (Enzyme Substrate)	E010	604873	2	16	12.5	10.0	✓
Total Mercury in Water by CVAAS	E508	612858	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	605128	1	12	8.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	614138	1	17	5.8	5.0	✓
TSS by Gravimetry	E160	609891	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	604666	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
Chlorophyll-a by Fluorometry	E870	604898	1	6	16.6	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	607710	1	5	20.0	5.0	✓
Total Mercury in Water by CVAAS	E508	612858	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	605128	1	12	8.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	614138	1	17	5.8	5.0	✓
TSS by Gravimetry	E160	609891	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	604666	1	14	7.1	5.0	✓
Method Blanks (MB)							
Chlorophyll-a by Fluorometry	E870	604898	1	6	16.6	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	607710	1	5	20.0	5.0	✓
Total Coliforms and E. coli (Enzyme Substrate)	E010	604873	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	612858	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	605128	1	12	8.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	614138	1	17	5.8	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							
TSS by Gravimetry	E160	609891	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	604666	1	14	7.1	5.0	✓
Matrix Spikes (MS)							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	607710	1	5	20.0	5.0	✓
Total Mercury in Water by CVAAS	E508	612858	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	605128	1	12	8.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	614138	1	17	5.8	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
PAHs by Hex:Ace GC-MS	E641A Vancouver - Environmental	Soil/Solid	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are extracted with hexane/acetone and analyzed by GC-MS. If reported, IACR (index of additive cancer risk, unitless) and B(a)P toxic potency equivalent (in soil concentration units) are calculated as per CCME PAH Soil Quality Guidelines fact sheet (2010) or ABT1.
Total Coliforms and E. coli (Enzyme Substrate)	E010 Vancouver - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ±0.5°C for either 18 or 24 hours (dependent on reagent used).
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	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.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Chlorophyll-a by Fluorometry	E870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PHCs and PAHs Hexane-Acetone Tumbler Extraction	EP601 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1 (mod)	Samples are subsampled and Petroleum Hydrocarbons (PHC) and PAHs are extracted with 1:1 hexane:acetone using a rotary extractor.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Chlorophyll-a Extraction	EP870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22B8970**	Page	: 1 of 14
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 16-Aug-2022 09:10
PO	: ----	Date Analysis Commenced	: 16-Aug-2022
C-O-C number	: 20-982084	Issue Date	: 25-Aug-2022 07:07
Sampler	: A B, T R		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 9		
No. of samples analysed	: 9		

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*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Microbiology, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	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: **Soil/Solid**

					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: 614229)											
VA22B8970-006	SWMP03	moisture	----	E144	0.25	%	94.9	94.8	0.0836%	20%	----
Polycyclic Aromatic Hydrocarbons (QC Lot: 614227)											
VA22B8970-006	SWMP03	acenaphthene	83-32-9	E641A	0.147	mg/kg	<0.164	<0.147	0.017	Diff <2x LOR	----
		acenaphthylene	208-96-8	E641A	0.147	mg/kg	<0.164	<0.147	0.017	Diff <2x LOR	----
		acridine	260-94-6	E641A	0.147	mg/kg	<0.164	<0.147	0.017	Diff <2x LOR	----
		anthracene	120-12-7	E641A	0.147	mg/kg	<0.164	<0.147	0.017	Diff <2x LOR	----
		benz(a)anthracene	56-55-3	E641A	0.147	mg/kg	0.168	<0.147	0.021	Diff <2x LOR	----
		benzo(a)pyrene	50-32-8	E641A	0.147	mg/kg	0.268	0.238	0.030	Diff <2x LOR	----
		benzo(b+j)fluoranthene	n/a	E641A	0.147	mg/kg	0.575	0.467	0.108	Diff <2x LOR	----
		benzo(g,h,i)perylene	191-24-2	E641A	0.147	mg/kg	0.568	0.483	0.084	Diff <2x LOR	----
		benzo(k)fluoranthene	207-08-9	E641A	0.147	mg/kg	<0.164	<0.147	0.017	Diff <2x LOR	----
		chrysene	218-01-9	E641A	0.147	mg/kg	0.187	0.151	0.036	Diff <2x LOR	----
		dibenz(a,h)anthracene	53-70-3	E641A	0.147	mg/kg	<0.164	<0.147	0.017	Diff <2x LOR	----
		fluoranthene	206-44-0	E641A	0.147	mg/kg	0.480	0.404	0.076	Diff <2x LOR	----
		fluorene	86-73-7	E641A	0.147	mg/kg	<0.164	<0.147	0.017	Diff <2x LOR	----
		indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.147	mg/kg	0.537	0.473	0.064	Diff <2x LOR	----
		methylnaphthalene, 1-	90-12-0	E641A	0.147	mg/kg	<0.164	<0.147	0.017	Diff <2x LOR	----
		methylnaphthalene, 2-	91-57-6	E641A	0.147	mg/kg	<0.164	<0.147	0.017	Diff <2x LOR	----
		naphthalene	91-20-3	E641A	0.147	mg/kg	<0.164	<0.147	0.017	Diff <2x LOR	----
		phenanthrene	85-01-8	E641A	0.147	mg/kg	0.196	0.169	0.027	Diff <2x LOR	----
		pyrene	129-00-0	E641A	0.147	mg/kg	0.434	0.360	0.074	Diff <2x LOR	----
		quinoline	91-22-5	E641A	0.147	mg/kg	<0.164	<0.147	0.017	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
Physical Tests (QC Lot: 604666)											
KS2202962-001	Anonymous	turbidity	----	E121	0.10	NTU	0.45	0.43	0.03	Diff <2x LOR	----
Physical Tests (QC Lot: 609891)											
FJ2202165-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 607710)											
KS2202988-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.200	mg/L	6.26	6.30	0.713%	20%	----
Anions and Nutrients (QC Lot: 614138)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 614138) - continued											
KS2203005-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0375	0.0376	0.293%	20%	----
Microbiological Tests (QC Lot: 604873)											
VA22B8970-001	SWMP03-1m	coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	2	<1	1	Diff <2x LOR	----
VA22B8987-006	Anonymous	coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 605128)											
VA22B8970-001	SWMP03-1m	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0269	0.0280	0.0011	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00025	0.00026	0.00001	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0190	0.0192	1.02%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.025	0.025	0.00003	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	16.6	16.6	0.107%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00168	0.00170	0.00001	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.053	0.054	0.0010	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000942	0.000986	4.62%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	1.74	1.75	0.743%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0280	0.0282	0.575%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000217	0.000213	0.000004	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.350	0.350	0.0002	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00047	0.00050	0.00003	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000086	0.000068	0.000018	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.77	2.81	1.28%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	8.26	8.17	1.07%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0502	0.0499	0.565%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	1.64	1.72	0.07	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	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*
Total Metals (QC Lot: 605128) - continued											
VA22B8970-001	SWMP03-1m	thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00037	0.00044	0.00007	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00055	0.00059	0.00004	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0069	0.0072	0.0003	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 612858)											
FJ2202192-001	Anonymous	mercury, total	7439-97-6	E508	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: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 614229)						
moisture	----	E144	0.25	%	<0.25	----
Polycyclic Aromatic Hydrocarbons (QCLot: 614227)						
acenaphthene	83-32-9	E641A	0.05	mg/kg	<0.050	----
acenaphthylene	208-96-8	E641A	0.05	mg/kg	<0.050	----
acridine	260-94-6	E641A	0.05	mg/kg	<0.050	----
anthracene	120-12-7	E641A	0.05	mg/kg	<0.050	----
benz(a)anthracene	56-55-3	E641A	0.05	mg/kg	<0.050	----
benzo(a)pyrene	50-32-8	E641A	0.05	mg/kg	<0.050	----
benzo(b+j)fluoranthene	n/a	E641A	0.05	mg/kg	<0.050	----
benzo(g,h,i)perylene	191-24-2	E641A	0.05	mg/kg	<0.050	----
benzo(k)fluoranthene	207-08-9	E641A	0.05	mg/kg	<0.050	----
chrysene	218-01-9	E641A	0.05	mg/kg	<0.050	----
dibenz(a,h)anthracene	53-70-3	E641A	0.05	mg/kg	<0.050	----
fluoranthene	206-44-0	E641A	0.05	mg/kg	<0.050	----
fluorene	86-73-7	E641A	0.05	mg/kg	<0.050	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.05	mg/kg	<0.050	----
methylnaphthalene, 1-	90-12-0	E641A	0.05	mg/kg	<0.050	----
methylnaphthalene, 2-	91-57-6	E641A	0.05	mg/kg	<0.050	----
naphthalene	91-20-3	E641A	0.05	mg/kg	<0.050	----
phenanthrene	85-01-8	E641A	0.05	mg/kg	<0.050	----
pyrene	129-00-0	E641A	0.05	mg/kg	<0.050	----
quinoline	91-22-5	E641A	0.05	mg/kg	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 604666)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 609891)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 607710)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 614138)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Microbiological Tests (QCLot: 604873)						
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Total Metals (QCLot: 605128)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 605128) - continued						
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 612858)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Plant Pigments (QCLot: 604898)						
chlorophyll a	479-61-8	E870	0.01	µg/L	<0.010	----

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: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 614229)									
moisture	----	E144	0.25	%	50 %	99.9	90.0	110	----
Polycyclic Aromatic Hydrocarbons (QCLot: 614227)									
acenaphthene	83-32-9	E641A	0.05	mg/kg	0.5 mg/kg	91.0	60.0	130	----
acenaphthylene	208-96-8	E641A	0.05	mg/kg	0.5 mg/kg	91.3	60.0	130	----
acridine	260-94-6	E641A	0.05	mg/kg	0.5 mg/kg	92.6	60.0	130	----
anthracene	120-12-7	E641A	0.05	mg/kg	0.5 mg/kg	94.8	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.05	mg/kg	0.5 mg/kg	92.9	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.05	mg/kg	0.5 mg/kg	93.0	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.05	mg/kg	0.5 mg/kg	91.6	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.05	mg/kg	0.5 mg/kg	90.7	60.0	130	----
benzo(k)fluoranthene	207-08-9	E641A	0.05	mg/kg	0.5 mg/kg	92.7	60.0	130	----
chrysene	218-01-9	E641A	0.05	mg/kg	0.5 mg/kg	92.9	60.0	130	----
dibenz(a,h)anthracene	53-70-3	E641A	0.05	mg/kg	0.5 mg/kg	91.1	60.0	130	----
fluoranthene	206-44-0	E641A	0.05	mg/kg	0.5 mg/kg	92.5	60.0	130	----
fluorene	86-73-7	E641A	0.05	mg/kg	0.5 mg/kg	93.8	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.05	mg/kg	0.5 mg/kg	91.8	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.05	mg/kg	0.5 mg/kg	91.4	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.05	mg/kg	0.5 mg/kg	93.3	60.0	130	----
naphthalene	91-20-3	E641A	0.05	mg/kg	0.5 mg/kg	91.9	50.0	130	----
phenanthrene	85-01-8	E641A	0.05	mg/kg	0.5 mg/kg	93.6	60.0	130	----
pyrene	129-00-0	E641A	0.05	mg/kg	0.5 mg/kg	93.8	60.0	130	----
quinoline	91-22-5	E641A	0.05	mg/kg	0.5 mg/kg	89.1	60.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 604666)									
turbidity	----	E121	0.1	NTU	200 NTU	99.4	85.0	115	----
Physical Tests (QCLot: 609891)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	91.0	85.0	115	----
Anions and Nutrients (QCLot: 607710)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	95.6	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 614138)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.3	80.0	120	----
Total Metals (QCLot: 605128)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	105	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	98.8	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	99.4	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	99.8	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.8	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.5	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	104	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	99.7	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	102	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	109	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	108	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	94.9	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	109	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	105	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	98.6	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	99.0	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	93.8	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	100	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 605128) - continued									
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	99.4	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	104	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	96.6	80.0	120	----
Total Metals (QCLot: 612858)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	97.4	80.0	120	----
Plant Pigments (QCLot: 604898)									
chlorophyll a	479-61-8	E870	0.01	µg/L	5 µg/L	90.2	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: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 614227)										
VA22B8970-008	SWMP06	acenaphthene	83-32-9	E641A	0.405 mg/kg	0.5 mg/kg	95.6	50.0	140	----
		acenaphthylene	208-96-8	E641A	0.403 mg/kg	0.5 mg/kg	95.0	50.0	140	----
		acridine	260-94-6	E641A	0.409 mg/kg	0.5 mg/kg	96.5	50.0	140	----
		anthracene	120-12-7	E641A	0.424 mg/kg	0.5 mg/kg	100	50.0	140	----
		benz(a)anthracene	56-55-3	E641A	0.410 mg/kg	0.5 mg/kg	96.7	50.0	140	----
		benzo(a)pyrene	50-32-8	E641A	0.417 mg/kg	0.5 mg/kg	98.4	50.0	140	----
		benzo(b+j)fluoranthene	n/a	E641A	0.409 mg/kg	0.5 mg/kg	96.4	50.0	140	----
		benzo(g,h,i)perylene	191-24-2	E641A	0.405 mg/kg	0.5 mg/kg	95.5	50.0	140	----
		benzo(k)fluoranthene	207-08-9	E641A	0.425 mg/kg	0.5 mg/kg	100	50.0	140	----
		chrysene	218-01-9	E641A	0.410 mg/kg	0.5 mg/kg	96.8	50.0	140	----
		dibenz(a,h)anthracene	53-70-3	E641A	0.406 mg/kg	0.5 mg/kg	95.9	50.0	140	----
		fluoranthene	206-44-0	E641A	0.410 mg/kg	0.5 mg/kg	96.8	50.0	140	----
		fluorene	86-73-7	E641A	0.416 mg/kg	0.5 mg/kg	98.1	50.0	140	----
		indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.404 mg/kg	0.5 mg/kg	95.3	50.0	140	----
		methylnaphthalene, 1-	90-12-0	E641A	0.404 mg/kg	0.5 mg/kg	95.3	50.0	140	----
		methylnaphthalene, 2-	91-57-6	E641A	0.410 mg/kg	0.5 mg/kg	96.8	50.0	140	----
		naphthalene	91-20-3	E641A	0.407 mg/kg	0.5 mg/kg	96.0	50.0	140	----
		phenanthrene	85-01-8	E641A	0.418 mg/kg	0.5 mg/kg	98.7	50.0	140	----
		pyrene	129-00-0	E641A	0.418 mg/kg	0.5 mg/kg	98.7	50.0	140	----
		quinoline	91-22-5	E641A	0.390 mg/kg	0.5 mg/kg	92.0	50.0	140	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 607710)										
VA22B8970-001	SWMP03-1m	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0295 mg/L	0.03 mg/L	98.4	70.0	130	----
Anions and Nutrients (QCLot: 614138)										
KS2203005-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0488 mg/L	0.05 mg/L	97.7	70.0	130	----
Total Metals (QCLot: 605128)										
VA22B8970-002	SWMP03-5m	aluminum, total	7429-90-5	E420	0.194 mg/L	0.2 mg/L	97.2	70.0	130	----
		antimony, total	7440-36-0	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0196 mg/L	0.02 mg/L	98.2	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
Total Metals (QCLot: 605128) - continued										
VA22B8970-002	SWMP03-5m	barium, total	7440-39-3	E420	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00975 mg/L	0.01 mg/L	97.5	70.0	130	----
		boron, total	7440-42-8	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00394 mg/L	0.004 mg/L	98.4	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		chromium, total	7440-47-3	E420	0.0383 mg/L	0.04 mg/L	95.7	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0193 mg/L	0.02 mg/L	96.3	70.0	130	----
		copper, total	7440-50-8	E420	0.0193 mg/L	0.02 mg/L	96.3	70.0	130	----
		iron, total	7439-89-6	E420	1.97 mg/L	2 mg/L	98.7	70.0	130	----
		lead, total	7439-92-1	E420	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		lithium, total	7439-93-2	E420	0.0988 mg/L	0.1 mg/L	98.8	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, total	7440-02-0	E420	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.14 mg/L	10 mg/L	91.4	70.0	130	----
		potassium, total	7440-09-7	E420	4.04 mg/L	4 mg/L	101	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		selenium, total	7782-49-2	E420	0.0414 mg/L	0.04 mg/L	103	70.0	130	----
		silicon, total	7440-21-3	E420	9.97 mg/L	10 mg/L	99.7	70.0	130	----
		silver, total	7440-22-4	E420	0.00389 mg/L	0.004 mg/L	97.3	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	20.6 mg/L	20 mg/L	103	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		thallium, total	7440-28-0	E420	0.00374 mg/L	0.004 mg/L	93.5	70.0	130	----
		thorium, total	7440-29-1	E420	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		tin, total	7440-31-5	E420	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		titanium, total	7440-32-6	E420	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		uranium, total	7440-61-1	E420	0.00388 mg/L	0.004 mg/L	97.1	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0987 mg/L	0.1 mg/L	98.7	70.0	130	----
		zinc, total	7440-66-6	E420	0.390 mg/L	0.4 mg/L	97.6	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0409 mg/L	0.04 mg/L	102	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 612858)										
FJ2202192-002	Anonymous	mercury, total	7439-97-6	E508	0.0000976 mg/L	0.0001 mg/L	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 982084

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver
Work Order Reference
VA22B8970

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	BC Conservation Foundation
Contact:	Thea Rodgers
Phone:	(250) 390-2525 ext. 104
	Company address below will appear on the final report
Street:	#405 - 1885 Boxwood Rd
City/Province:	Nanaimo, BC
Postal Code:	V9T 0A6
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 trodgers@bccf.com
Email 2
Email 3

Invoice Recipients

Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax trodgers@bccf.com
Email 2 llimenda@bccf.com

Turnaround Time (TAT) Requested

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

Date and Time Required for all E&P TATs:

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

Project Information

ALS Account # / Quote #: VA 2022 BCCF 1000001
Job #: 1303015 ENDS
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: Sampler: TRIAB

Analysis Requ

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Total Phosphorous (P)	Orthophosphate	Total metals, Hg, Hardness	TSS + Turbidity	Chlorophyll-a	E. coli	PAH (Sediment)	SAMPLES ON HOLD	EXTENDED STORAGE REQU	SUSPECTED HAZARD (see n
	SWMP 03 - 1m	15-08-22	11:30	WATER		✓	✓	✓	✓	✓	✓				
	SWMP 03 - 5m	"	11:35	"		✓	✓	✓	✓	✓					
	SWMP 03 - 10m	"	11:55	"		✓	✓	✓	✓	✓					
	SWMP 04 - 1m	"	13:15	"							✓				
	SWMP 06 - 1m	"	13:45	"							✓				
	SWMP 03	"	13:00	Sediment								✓			
	SWMP 04	"	13:30	"								✓			
	SWMP 06	"	13:50	"								✓			
	SWMP 03 - 5m Duplicate	"	11:45	water		✓	✓	✓	✓	✓					

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)

Only Phosphorous has preservative, all others + E. coli need lab pres. / filtration please.

SAMPLE RECEIPT DETAILS (ALS use only)

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
TRIAB		

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
JC	AUG 16 2022	9:10am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B9715**	Page	: 1 of 4
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 24-Aug-2022 09:15
PO	: ----	Date Analysis Commenced	: 24-Aug-2022
C-O-C number	: 20-982086	Issue Date	: 31-Aug-2022 14:46
Sampler	: TR/JD		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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*
Brieanna Allen	Production/Validation Manager	Microbiology, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Woochan Song	Lab 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*
mg/L	milligrams per litre
MPN/100mL	most probable number per 100 mL
NTU	nephelometric turbidity units

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-03 1m	SWMP-03 5m	SWMP-03 10m	SWMP-03 1m duplicate	SWMP-04 1m
					Client sampling date / time	23-Aug-2022 11:45	23-Aug-2022 11:54	23-Aug-2022 11:59	23-Aug-2022 11:45	23-Aug-2022 12:20
						VA22B9715-001	VA22B9715-002	VA22B9715-003	VA22B9715-004	VA22B9715-005
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		44.9	42.6	44.4	44.6	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		----	<3.0	----	----	----
turbidity	----	E121	0.10	NTU		----	1.44	----	----	----
Microbiological Tests										
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL		1	----	----	----	9
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0290	0.0138	0.0403	0.0289	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00024	0.00018	0.00032	0.00024	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0186	0.0179	0.0242	0.0189	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.022	0.020	0.019	0.023	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
calcium, total	7440-70-2	E420	0.050	mg/L		15.2	14.5	15.2	15.1	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	0.000010	<0.000010	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	0.00023	<0.00010	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00176	0.00128	0.00113	0.00180	----
iron, total	7439-89-6	E420	0.010	mg/L		0.071	0.090	3.58	0.071	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000391	0.000485	0.000237	0.00118	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.68	1.56	1.56	1.68	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0350	0.0591	0.388	0.0352	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000219	0.000196	0.000120	0.000229	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.349	0.333	0.408	0.350	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00052	0.00044	0.00056	0.00052	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-03 1m	SWMP-03 5m	SWMP-03 10m	SWMP-03 1m duplicate	SWMP-04 1m
					Client sampling date / time	23-Aug-2022 11:45	23-Aug-2022 11:54	23-Aug-2022 11:59	23-Aug-2022 11:45	23-Aug-2022 12:20
						VA22B9715-001	VA22B9715-002	VA22B9715-003	VA22B9715-004	VA22B9715-005
						Result	Result	Result	Result	Result
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		<0.000050	0.000078	0.000061	0.000075	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.76	2.82	4.25	2.66	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		7.64	7.18	7.15	7.65	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0498	0.0463	0.0498	0.0502	----
sulfur, total	7704-34-9	E420	0.50	mg/L		1.34	1.47	<0.50	1.15	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00045	<0.00030	0.00098	0.00050	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00077	<0.00050	0.00132	0.00065	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0058	<0.0030	<0.0030	0.0049	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-06 1m	----	----	----	----
					Client sampling date / time	23-Aug-2022 12:40	----	----	----	----
						VA22B9715-006	--------	--------	--------	--------
						Result	----	----	----	----
Microbiological Tests										
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL		7	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B9715**	Page	: 1 of 6
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 24-Aug-2022 09:15
PO	: ----	Issue Date	: 31-Aug-2022 14:46
C-O-C number	: 20-982086		
Sampler	: TR/JD		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP-06 1m	E010	23-Aug-2022	----	----	----		24-Aug-2022	30 hrs	25 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP-03 1m	E010	23-Aug-2022	----	----	----		24-Aug-2022	30 hrs	26 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP-04 1m	E010	23-Aug-2022	----	----	----		24-Aug-2022	30 hrs	26 hrs	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SWMP-03 5m	E160	23-Aug-2022	----	----	----		29-Aug-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SWMP-03 5m	E121	23-Aug-2022	----	----	----		26-Aug-2022	3 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03 10m	E508	23-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03 1m	E508	23-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03 1m duplicate	E508	23-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03 5m	E508	23-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP-03 10m	E420	23-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP-03 1m	E420	23-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP-03 1m duplicate	E420	23-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
SWMP-03 5m	E420	23-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	180 days	4 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)							
Total Coliforms and E. coli (Enzyme Substrate)	E010	617080	2	20	10.0	10.0	✓
Total Mercury in Water by CVAAS	E508	624750	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	619785	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	624063	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	620044	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Total Mercury in Water by CVAAS	E508	624750	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	619785	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	624063	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	620044	1	20	5.0	5.0	✓
Method Blanks (MB)							
Total Coliforms and E. coli (Enzyme Substrate)	E010	617080	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	624750	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	619785	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	624063	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	620044	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Total Mercury in Water by CVAAS	E508	624750	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	619785	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
Total Coliforms and E. coli (Enzyme Substrate)	E010 Vancouver - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ±0.5°C for either 18 or 24 hours (dependent on reagent used).
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22B9715**	Page	: 1 of 10
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 24-Aug-2022 09:15
PO	: ----	Date Analysis Commenced	: 24-Aug-2022
C-O-C number	: 20-982086	Issue Date	: 31-Aug-2022 14:48
Sampler	: TR/JD		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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*
Brieanna Allen	Production/Validation Manager	Vancouver Microbiology, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Woochan Song	Lab 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: 620044)											
KS2203105-001	Anonymous	turbidity	----	E121	0.10	NTU	0.39	0.41	0.02	Diff <2x LOR	----
Physical Tests (QC Lot: 624063)											
FJ2202286-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	9.3	9.3	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 617080)											
VA22B9679-011	Anonymous	coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
VA22B9693-001	Anonymous	coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 619785)											
VA22B9715-001	SWMP-03 1m	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0290	0.0294	0.0004	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00024	0.00025	0.00001	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0186	0.0188	0.596%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.022	0.024	0.001	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	15.2	16.2	6.04%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00176	0.00256	0.00080	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.071	0.072	0.0005	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000391	0.000395	0.000004	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	1.68	1.70	1.26%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0350	0.0355	1.33%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000219	0.000230	0.000011	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.349	0.357	0.008	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00052	0.00056	0.00004	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	0.000063	0.000013	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 619785) - continued											
VA22B9715-001	SWMP-03 1m	silicon, total	7440-21-3	E420	0.10	mg/L	2.76	2.71	2.00%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	7.64	7.74	1.24%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0498	0.0525	5.28%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	1.34	1.53	0.19	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00045	0.00059	0.00014	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00077	0.00069	0.00007	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0058	0.0064	0.0006	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 624750)											
FJ2202305-001	Anonymous	mercury, total	7439-97-6	E508	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: 620044)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 624063)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Microbiological Tests (QCLot: 617080)						
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Total Metals (QCLot: 619785)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 619785) - continued						
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 624750)						
mercury, total	7439-97-6	E508	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	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 620044)									
turbidity	----	E121	0.1	NTU	200 NTU	98.0	85.0	115	----
Physical Tests (QCLot: 624063)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	96.8	85.0	115	----
Total Metals (QCLot: 619785)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	99.6	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	97.7	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.0	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	94.8	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	91.5	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.8	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	94.2	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.8	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	97.1	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.6	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	103	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.6	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	98.7	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.9	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.3	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.1	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	105	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	98.1	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.4	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	92.6	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 619785) - continued									
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	92.2	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	94.2	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	92.9	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	94.0	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	99.6	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	99.2	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	94.1	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	95.8	80.0	120	----
Total Metals (QCLot: 624750)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	106	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
Total Metals (QCLot: 619785)										
VA22B9715-002	SWMP-03 5m	aluminum, total	7429-90-5	E420	0.190 mg/L	0.2 mg/L	95.2	70.0	130	----
		antimony, total	7440-36-0	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0191 mg/L	0.02 mg/L	95.6	70.0	130	----
		barium, total	7440-39-3	E420	0.0181 mg/L	0.02 mg/L	90.6	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0374 mg/L	0.04 mg/L	93.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00974 mg/L	0.01 mg/L	97.4	70.0	130	----
		boron, total	7440-42-8	E420	0.093 mg/L	0.1 mg/L	93.0	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0104 mg/L	0.01 mg/L	104	70.0	130	----
		chromium, total	7440-47-3	E420	0.0384 mg/L	0.04 mg/L	96.0	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		copper, total	7440-50-8	E420	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		iron, total	7439-89-6	E420	1.87 mg/L	2 mg/L	93.5	70.0	130	----
		lead, total	7439-92-1	E420	0.0195 mg/L	0.02 mg/L	97.6	70.0	130	----
		lithium, total	7439-93-2	E420	0.0914 mg/L	0.1 mg/L	91.4	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		nickel, total	7440-02-0	E420	0.0388 mg/L	0.04 mg/L	97.1	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.52 mg/L	10 mg/L	95.2	70.0	130	----
		potassium, total	7440-09-7	E420	3.98 mg/L	4 mg/L	99.5	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0198 mg/L	0.02 mg/L	99.2	70.0	130	----
		selenium, total	7782-49-2	E420	0.0378 mg/L	0.04 mg/L	94.4	70.0	130	----
		silicon, total	7440-21-3	E420	9.84 mg/L	10 mg/L	98.4	70.0	130	----
		silver, total	7440-22-4	E420	0.00416 mg/L	0.004 mg/L	104	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	20.2 mg/L	20 mg/L	101	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0390 mg/L	0.04 mg/L	97.4	70.0	130	----
		thallium, total	7440-28-0	E420	0.00384 mg/L	0.004 mg/L	96.0	70.0	130	----
		thorium, total	7440-29-1	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		tin, total	7440-31-5	E420	0.0196 mg/L	0.02 mg/L	98.0	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
Total Metals (QCLot: 619785) - continued										
VA22B9715-002	SWMP-03 5m	titanium, total	7440-32-6	E420	0.0382 mg/L	0.04 mg/L	95.5	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0192 mg/L	0.02 mg/L	96.1	70.0	130	----
		uranium, total	7440-61-1	E420	0.00398 mg/L	0.004 mg/L	99.4	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0971 mg/L	0.1 mg/L	97.1	70.0	130	----
		zinc, total	7440-66-6	E420	0.365 mg/L	0.4 mg/L	91.3	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0415 mg/L	0.04 mg/L	104	70.0	130	----
Total Metals (QCLot: 624750)										
FJ2202305-002	Anonymous	mercury, total	7439-97-6	E508	0.0000950 mg/L	0.0001 mg/L	95.0	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 982086

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report
Company:	BC Conservation Foundation
Contact:	Thea Rodgers
Phone:	(250) 390-2825 ext 104
	Company address below will appear on the final report
Street:	#105 - 1885 Boxwood Rd.
City/Province:	Nanaimo, BC
Postal Code:	V9T 0A6
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: trodgers@bccf.com

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: trodgers@bccf.com

Email 2: llimerick@bccf.com

Turnaround Time (TAT) Requested

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

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

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

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

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

☐ Same day [E2] If received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: 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 Account # / Quote #: VA2022 BCCF 1000001

Job #: 1303015 ENOS

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): 9715

ALS Contact: Sneha S. Sampler: TR / JD.

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)	PDT Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	E. Coli	Total Metals	Total Hg + Hardness	Turbidity / TSS	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
1	SWMP-03 1m	23-08	11:45	Water		✓	✓					
2	SWMP-03 5m	"	11:54	"			✓		✓			
3	SWMP-03 10m	"	11:59	"			✓					
4	SWMP-03 1m duplicate	"	11:45	"			✓					
5	SWMP-04 1m	"	12:20	"		✓						
6	SWMP-06 1m	"	12:40	"		✓						

Environmental Division Vancouver

Work Order Reference VA22B9715

Telephone : +1 604 253 4188

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

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

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

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

Non-Drinking Water

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
TR	23/08/22	1325

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	Aug 24/22	9:15

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C0292**	Page	: 1 of 5
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 30-Aug-2022 09:20
PO	: ----	Date Analysis Commenced	: 30-Aug-2022
C-O-C number	: 20-982085	Issue Date	: 06-Sep-2022 11:39
Sampler	: TR/HT		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Microbiology, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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*
mg/L	milligrams per litre
MPN/100mL	most probable number per 100 mL
NTU	nephelometric turbidity units

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-03-1m	SWMP-03-5m	SWMP-03-5m duplicate	SWMP-03-10m	SWMP-04-1m
					Client sampling date / time	29-Aug-2022 11:17	29-Aug-2022 11:20	29-Aug-2022 11:20	29-Aug-2022 11:26	29-Aug-2022 11:53
						VA22C0292-001	VA22C0292-002	VA22C0292-003	VA22C0292-004	VA22C0292-005
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		47.5	44.3	45.4	47.4	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		----	<3.0	----	----	----
turbidity	----	E121	0.10	NTU		----	1.40	----	----	----
Microbiological Tests										
coliforms, total	----	E010	1	MPN/100mL		75	----	----	----	261
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL		1	----	----	----	8
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0293	0.0133	0.0156	0.0404	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00024	0.00018	0.00019	0.00035	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0188	0.0178	0.0184	0.0255	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.025	0.021	0.021	0.019	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
calcium, total	7440-70-2	E420	0.050	mg/L		16.2	15.1	15.5	16.3	----
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	0.00025	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00138	0.00270	0.00134	0.00284	----
iron, total	7439-89-6	E420	0.010	mg/L		0.069	0.065	0.064	3.32	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.00174	0.000167	0.000810	0.000135	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		1.72	1.60	1.64	1.62	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0386	0.0556	0.0485	0.411	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000209	0.000191	0.000206	0.000121	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.366	0.332	0.342	0.406	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SWMP-03-1m	SWMP-03-5m	SWMP-03-5m duplicate	SWMP-03-10m	SWMP-04-1m
					Client sampling date / time	29-Aug-2022 11:17	29-Aug-2022 11:20	29-Aug-2022 11:20	29-Aug-2022 11:26	29-Aug-2022 11:53
						VA22C0292-001	VA22C0292-002	VA22C0292-003	VA22C0292-004	VA22C0292-005
						Result	Result	Result	Result	Result
Total Metals										
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00055	0.00042	0.00042	0.00056	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000078	0.000059	0.000067	0.000100	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.85	2.97	3.02	4.30	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		8.04	7.51	7.64	7.52	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0501	0.0473	0.0489	0.0493	----
sulfur, total	7704-34-9	E420	0.50	mg/L		1.53	1.68	1.64	0.64	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00049	0.00031	<0.00030	0.00105	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00055	<0.00050	<0.00050	0.00122	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0088	0.0047	0.0077	0.0049	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----

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

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)				Client sample ID	**SWMP-06-0.5m**	**----**	**----**	**----**	**----**
				Client sampling date / time	29-Aug-2022 12:11	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**VA22C0292-006**	**--------**	**--------**	**--------**	**--------**
					Result	----	----	----	----
Microbiological Tests									
coliforms, total	----	E010	1	MPN/100mL	236	----	----	----	----
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	6	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C0292**	Page	: 1 of 6
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 30-Aug-2022 09:20
PO	: ----	Issue Date	: 06-Sep-2022 11:39
C-O-C number	: 20-982085		
Sampler	: TR/HT		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP-03-1m	E010	29-Aug-2022	----	----	----		30-Aug-2022	30 hrs	25 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP-04-1m	E010	29-Aug-2022	----	----	----		30-Aug-2022	30 hrs	25 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
SWMP-06-0.5m	E010	29-Aug-2022	----	----	----		30-Aug-2022	30 hrs	25 hrs	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SWMP-03-5m	E160	29-Aug-2022	----	----	----		04-Sep-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SWMP-03-5m	E121	29-Aug-2022	----	----	----		01-Sep-2022	3 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03-10m	E508	29-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
SWMP-03-1m	E508	29-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) SWMP-03-5m	E508	29-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) SWMP-03-5m duplicate	E508	29-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-03-10m	E420	29-Aug-2022	02-Sep-2022	----	----		02-Sep-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-03-1m	E420	29-Aug-2022	02-Sep-2022	----	----		02-Sep-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-03-5m	E420	29-Aug-2022	02-Sep-2022	----	----		02-Sep-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) SWMP-03-5m duplicate	E420	29-Aug-2022	02-Sep-2022	----	----		02-Sep-2022	180 days	5 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)							
Total Coliforms and E. coli (Enzyme Substrate)	E010	625403	1	9	11.1	10.0	✓
Total Mercury in Water by CVAAS	E508	629084	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	629673	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	632715	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	628946	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Total Mercury in Water by CVAAS	E508	629084	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	629673	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	632715	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	628946	1	20	5.0	5.0	✓
Method Blanks (MB)							
Total Coliforms and E. coli (Enzyme Substrate)	E010	625403	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	629084	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	629673	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	632715	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	628946	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Total Mercury in Water by CVAAS	E508	629084	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	629673	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
Total Coliforms and E. coli (Enzyme Substrate)	E010 Vancouver - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ±0.5°C for either 18 or 24 hours (dependent on reagent used).
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22C0292**	Page	: 1 of 10
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 30-Aug-2022 09:20
PO	: ----	Date Analysis Commenced	: 30-Aug-2022
C-O-C number	: 20-982085	Issue Date	: 06-Sep-2022 11:39
Sampler	: TR/HT		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 6		
No. of samples analysed	: 6		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Vancouver Microbiology, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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: 628946)											
KS2203199-001	Anonymous	turbidity	----	E121	0.10	NTU	5.30	5.15	2.95%	15%	----
Physical Tests (QC Lot: 632715)											
VA22C0292-002	SWMP-03-5m	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 625403)											
VA22C0276-002	Anonymous	coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
		coliforms, total	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 629084)											
KS2203199-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 629673)											
VA22C0292-001	SWMP-03-1m	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0293	0.0297	0.0004	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00024	0.00023	0.000006	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0188	0.0185	1.22%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.025	0.024	0.0002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	16.2	15.8	2.79%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00138	0.00133	0.00004	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.069	0.068	0.0007	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.00174	0.00173	0.0972%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	1.72	1.69	1.78%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0386	0.0373	3.44%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000209	0.000213	0.000004	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.366	0.357	0.008	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 629673) - continued											
VA22C0292-001	SWMP-03-1m	rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00055	0.00054	0.000010	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000078	0.000051	0.000027	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.85	2.71	5.15%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	8.04	7.91	1.69%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0501	0.0501	0.136%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	1.53	1.38	0.15	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00049	0.00055	0.00006	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00055	0.00054	0.00001	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0088	0.0086	0.0002	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	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: 628946)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 632715)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Microbiological Tests (QCLot: 625403)						
coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
coliforms, total	----	E010	1	MPN/100mL	<1	----
Total Metals (QCLot: 629084)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 629673)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 629673) - continued						
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 628946)									
turbidity	----	E121	0.1	NTU	200 NTU	97.5	85.0	115	----
Physical Tests (QCLot: 632715)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	96.5	85.0	115	----
Total Metals (QCLot: 629084)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	106	80.0	120	----
Total Metals (QCLot: 629673)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	94.4	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	97.4	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	89.2	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	106	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	96.2	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	98.0	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	105	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	97.8	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.9	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	98.7	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.9	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	109	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	111	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	106	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	108	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	110	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	93.3	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	106	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 629673) - continued									
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	98.1	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	92.0	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	99.3	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	94.6	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	94.7	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	101	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	94.3	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	106	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	106	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	103	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	97.4	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
Total Metals (QCLot: 629084)										
VA22C0181-002	Anonymous	mercury, total	7439-97-6	E508	0.0000937 mg/L	0.0001 mg/L	93.7	70.0	130	----
Total Metals (QCLot: 629673)										
VA22C0292-002	SWMP-03-5m	aluminum, total	7429-90-5	E420	0.191 mg/L	0.2 mg/L	95.7	70.0	130	----
		antimony, total	7440-36-0	E420	0.0195 mg/L	0.02 mg/L	97.3	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		barium, total	7440-39-3	E420	0.0189 mg/L	0.02 mg/L	94.4	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0373 mg/L	0.04 mg/L	93.2	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00992 mg/L	0.01 mg/L	99.2	70.0	130	----
		boron, total	7440-42-8	E420	0.096 mg/L	0.1 mg/L	96.4	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00407 mg/L	0.004 mg/L	102	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00979 mg/L	0.01 mg/L	97.9	70.0	130	----
		chromium, total	7440-47-3	E420	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		copper, total	7440-50-8	E420	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		iron, total	7439-89-6	E420	1.91 mg/L	2 mg/L	95.6	70.0	130	----
		lead, total	7439-92-1	E420	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		lithium, total	7439-93-2	E420	0.0951 mg/L	0.1 mg/L	95.1	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0200 mg/L	0.02 mg/L	99.8	70.0	130	----
		nickel, total	7440-02-0	E420	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.20 mg/L	10 mg/L	92.0	70.0	130	----
		potassium, total	7440-09-7	E420	4.11 mg/L	4 mg/L	103	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0194 mg/L	0.02 mg/L	96.9	70.0	130	----
		selenium, total	7782-49-2	E420	0.0434 mg/L	0.04 mg/L	108	70.0	130	----
		silicon, total	7440-21-3	E420	9.81 mg/L	10 mg/L	98.1	70.0	130	----
		silver, total	7440-22-4	E420	0.00406 mg/L	0.004 mg/L	101	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	18.9 mg/L	20 mg/L	94.7	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0378 mg/L	0.04 mg/L	94.5	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
Total Metals (QCLot: 629673) - continued										
VA22C0292-002	SWMP-03-5m	thallium, total	7440-28-0	E420	0.00387 mg/L	0.004 mg/L	96.7	70.0	130	----
		thorium, total	7440-29-1	E420	0.0212 mg/L	0.02 mg/L	106	70.0	130	----
		tin, total	7440-31-5	E420	0.0189 mg/L	0.02 mg/L	94.3	70.0	130	----
		titanium, total	7440-32-6	E420	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		uranium, total	7440-61-1	E420	0.00397 mg/L	0.004 mg/L	99.3	70.0	130	----
		vanadium, total	7440-62-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.400 mg/L	0.4 mg/L	100	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 982085

Canada Toll Free: 1 800 668 9878

Page of

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Environmental Division Vancouver
Work Order Reference
VA22C0292

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	BC Conservation Foundation	Select Report Format: ☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)	☒ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Thea Rodgers	Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:	(250) 390-2505 ext 104	☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	#105 - 1885 Bowwood Rd	Email 1 or Fax trodgers@bccf.com	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	Nanaimo, BC	Email 2	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additi may apply to rush requests on weekends, statutory holidays and non-rou
Postal Code:	V9T 0A6	Email 3	Date and Time Required for all E&P TATs:
Invoice To	Same as Report To ☒ YES ☐ NO	Invoice Recipients	For all tests with rush TATs requested, please co
	Copy of Invoice with Report ☒ YES ☐ NO	Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX	Analysis Req
Company:		Email 1 or Fax trodgers@bccf.com	Indicate Filtered (F), Preserved (P) or Filtered and
Contact:		Email 2 llimerick@bccf.com	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA2022 BCCF 100 0001	AFE/Cost Center:	PO#:
Job #:	130 3015 ENOS	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	292	ALS Contact: Sneha	Sampler: TE/HT

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm) (PDT)	Sample Type	NUMBER OF CONTAINERS: Total metals, hardness, Hg	E. Coli	TSS + turbidity	SAMPLES ON HOLD	EXTENDED STORAGE REQUI	SUSPECTED HAZARD (see no
	SWMP-03 - 1m	29-08-22	11:17	water	✓	✓				
	SWMP-03 - 5m	"	11:20	"	✓		✓			
	SWMP-03 - 5m duplicate	"	11:20	"	✓					
	SWMP-03 - 10m	"	11:26	"	✓					
	SWMP-04 - 1m	"	11:53	"		✓				
	SWMP-06 - 0.5m	"	12:11	"		✓				

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	Non D.W.
Are samples for human consumption/ use? ☐ YES ☒ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
					4		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)		FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: TR.	Date: 29/08/2022	Time: 1310	Received by:	Date:	Time:	Received by: JC	Date: 30 Aug 22 Time: 920am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C8351**	Page	: 1 of 2
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 22-Nov-2022 09:20
PO	: ----	Date Analysis Commenced	: 23-Nov-2022
C-O-C number	: 20-982087	Issue Date	: 29-Nov-2022 17:18
Sampler	: TR		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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*
Lindsay Gung	Supervisor - Water Chemistry	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*
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Client sample ID*	**SWMP03-1m**	**SWMP03-5m**	**SWMP03-10m**	**SWMP03-duplicate 10m**	**----**
					Client sampling date / time	21-Nov-2022 12:54	21-Nov-2022 12:50	21-Nov-2022 12:40	21-Nov-2022 12:46	----
						VA22C8351-001	**VA22C8351-002**	**VA22C8351-003**	**VA22C8351-004**	**--------**
						Result	Result	Result	Result	----
Anions and Nutrients										
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0141	0.0117	0.0126	0.0133	----
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg/L		16.6	14.0	12.9	12.4	----

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

ALS Canada Ltd.

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right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C8351**	Page	: 1 of 6
Client	: **The British Columbia Conservation Foundation**	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-390-2525	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 22-Nov-2022 09:20
PO	: ----	Issue Date	: 29-Nov-2022 17:21
C-O-C number	: 20-982087		
Sampler	: TR		
Site	: ----		
Quote number	: VA2022BCCF1000001		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE SWMP03-10m	E378-U	21-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE SWMP03-1m	E378-U	21-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE SWMP03-5m	E378-U	21-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE SWMP03-duplicate 10m	E378-U	21-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	3 days	2 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SWMP03-10m	E372-U	21-Nov-2022	27-Nov-2022	----	----		29-Nov-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SWMP03-1m	E372-U	21-Nov-2022	27-Nov-2022	----	----		29-Nov-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SWMP03-5m	E372-U	21-Nov-2022	27-Nov-2022	----	----		29-Nov-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SWMP03-duplicate 10m	E372-U	21-Nov-2022	27-Nov-2022	----	----		29-Nov-2022	28 days	8 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE SWMP03-10m	E870	21-Nov-2022	23-Nov-2022	2 days	2 days	✓	23-Nov-2022	672 hrs	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE SWMP03-1m	E870	21-Nov-2022	23-Nov-2022	2 days	2 days	✓	23-Nov-2022	672 hrs	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE SWMP03-5m	E870	21-Nov-2022	23-Nov-2022	2 days	2 days	✓	23-Nov-2022	672 hrs	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE SWMP03-duplicate 10m	E870	21-Nov-2022	23-Nov-2022	2 days	2 days	✓	23-Nov-2022	672 hrs	0 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)							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	753890	1	10	10.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	759320	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Chlorophyll-a by Fluorometry	E870	754174	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	753890	1	10	10.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	759320	1	18	5.5	5.0	✓
Method Blanks (MB)							
Chlorophyll-a by Fluorometry	E870	754174	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	753890	1	10	10.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	759320	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	753890	1	10	10.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	759320	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
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	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.
Chlorophyll-a by Fluorometry	E870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Chlorophyll-a Extraction	EP870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

QUALITY CONTROL REPORT

Work Order	: **VA22C8351**	Page	: 1 of 4
Client	: The British Columbia Conservation Foundation	Laboratory	: Vancouver - Environmental
Contact	: Thea Rodgers	Account Manager	: Sneha Sansare
Address	: 105 - 1885 Boxwood Rd Nanaimo BC Canada V9S 5X9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 1303015 ENOS	Date Samples Received	: 22-Nov-2022 09:20
PO	: ----	Date Analysis Commenced	: 23-Nov-2022
C-O-C number	: 20-982087	Issue Date	: 29-Nov-2022 17:19
Sampler	: TR 250-390-2525		
Site	: ----		
Quote number	: VA2022BCCF1000001		
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*
Lindsay Gung	Supervisor - Water Chemistry	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*
Anions and Nutrients (QC Lot: 753890)											
VA22C8293-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 759320)											
KS2204492-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.204	0.231	12.4%	20%	----

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
Anions and Nutrients (QCLot: 753890)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 759320)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Plant Pigments (QCLot: 754174)						
chlorophyll a	479-61-8	E870	0.01	µg/L	<0.010	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 753890)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	98.3	80.0	120	----
Anions and Nutrients (QCLot: 759320)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.3	80.0	120	----
Plant Pigments (QCLot: 754174)									
chlorophyll a	479-61-8	E870	0.01	µg/L	5 µg/L	91.4	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: 753890)										
VA22C8351-001	SWMP03-1m	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0287 mg/L	0.03 mg/L	95.7	70.0	130	----
Anions and Nutrients (QCLot: 759320)										
KS2204492-002	Anonymous	phosphorus, total	7723-14-0	E372-U	4.08 mg/L	5 mg/L	81.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 982087

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Environmental Division Vancouver
Work Order Reference
VA22C8351

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	BC Conservation Foundation
Contact:	Thea Rodgers
Phone:	(250) 390-2525 ext 104
	Company address below will appear on the final report
Street:	#105 - 1885 Boxwood Rd.
City/Province:	Nanaimo, BC
Postal Code:	V9T 0A6
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: trodgers@bccf.com
Email 2:
Email 3:

Invoice Recipients

Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: trodgers@bccf.com
Email 2: llimerick@bccf.com

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. Ac
may apply to rush requests on weekends, statutory holidays and non

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, pleas

Project Information

ALS Account # / Quote #: VA2022 BCCF 100 0301
Job #: 1303015 ENOS
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): 6351
ALS Contact: Sneha S. Sampler: TR

Analysis

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

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	Total Phosphorus (P)	Orthophosphate	Chlorophyll-a	SAMPLES ON HOLD	EXTENDED STORAGE REQ	SUSPECTED HAZARD (see
	SWMP03-1m	21-11-22	1254	Water	3	✓	✓	✓			
	SWMP03-5m	21-11-22	1250	"	3	✓	✓	✓			
	SWMP03-10m	21-11-22	1240	"	3	✓	✓	✓			
	SWMP03-duplicate 10m	21-11-22	1246	"	3	✓	✓	✓			

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)

unfiltered chlorophyll-a, please filter w/i 48 hours if possible.

SAMPLE RECEIPT DETAILS (ALS use only)

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

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	6

SHIPMENT RELEASE (client use)

Released by: TR Date: NOV 21 '22 Time:

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: 11/22/22 Time: 9:20

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Appendix 2 – Limnologist's report

Enos Lake Protection and Monitoring Program:

Review of Water Quality Data for 5 Year Period from 2017 to 2022

From PGL, 2016

For: **BC Conservation Foundation, Lantzville Office**

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By: John Deniseger

December 2022

Summary

BCCF's Enos Lake annual fundamental water quality monitoring program in 2022 included components that are done on an annual basis as well as others that are done on a 5-year cycle. This report examines the results from the data collected in 2022, and compares them to Enos Lake water quality targets, BC water quality guidelines, and trophic status indicators for Enos Lake.

In 2022, the extreme summer drought once again appeared to exacerbate the annual summer anoxic conditions at depth. As a result, the lack of oxygen extended up into the relatively shallow waters of the thermocline, well into the fall. While it is not known whether this has occurred prior to 2017, it is concerning as the lake was more susceptible to a summer "fish kill". It appears that Enos Lake is generally mesotrophic to eutrophic, with annual climatic conditions which shift the lake to appearing more eutrophic. Climate change will present further challenges as summer water temperatures increase, summer stratification will begin earlier and extend later, with more severe oxygen depletion. The past 2 years are likely examples of the transition to more extreme summer conditions predicted in the future.

In 2022, Enos Lake would be considered a mesotrophic lake based on indicators such as phosphorus and eutrophic using chlorophyll a. For the first time since 2018, the annual mean phosphorus target of 12 ug/L was not met. Factoring in year-to-year variability and the lack of oxygen at depth during the summer, the data collected over the last 5 years suggests that Enos Lake is mesotrophic to eutrophic.

The 5-year cycle component of the program included bacteriological sampling, metals in the water column and PAHs in the sediment. The bacteriological sampling found that E. coli was well within the BC guidelines for primary recreational use (swimming), while metals were generally well within the BC guidelines for aquatic life. There were several examples requiring further interpretation. For instance, the mid-summer anoxic conditions in the deeper waters of Enos Lake, lead to the release of iron from the sediments in the lake, which then exceeded the BC guidelines. Copper concentrations in Enos Lake may be slightly elevated but require further data (dissolved organic carbon) for subsequent interpretation. In addition, while some PAHs have been detected in Enos Lake sediments, there is no information on the source or whether the source is historic or more recent.

1.0 Background

Enos Lake is a small lake with a surface area of 18 ha and a watershed area of approximately 235 ha. It is in a largely undeveloped area of the Fairwinds Community in Nanoose Bay, B.C. Approximately 12 ha have been developed with predominantly low-density residential housing (PGL, 2016, Nordin 2017).

While some water quality sampling has been carried out since 2006, a standardized sampling program was established in 2017. Sampling history prior to 2017 is further outlined in Nordin (2017). The 2018 through 2021 data are reviewed in Deniseger (2018, 2019, 2020, 2021).

The current water sampling program is intended to build a consistent, long-term database used to both act as a screening tool and to help assess the overall health of Enos Lake with respect to ongoing development, land use, and increasing population within the watershed over the next 10 to 20 years. Fundamental water chemistry and biology are indicators of water quality, potential change, and overall lake and watershed health. The data will be used to assess year-to-year lake health and trends over time. Annual sampling focuses on lake productivity through nutrient analysis and field data collection. Every

fifth year beginning in 2017 and recurring in 2022, additional sampling examines lake health through sediment sampling for PAHs, as well as mid-summer water column sampling for E. coli and metals. In 2022, BC Lake Stewardship Society (BCLSS) volunteers collected significant additional field data for secchi depth, temperature, and dissolved oxygen.

The purpose of this report is to review the annual data collected in 2021, as well as a summation of the 5-year cycle data to provide a summary report documenting any changes or potential trends observed since 2017.

2.0 Water Quality Results

Table 2.0 below (PGL, 2016) outlines the standardized water quality monitoring which began in 2017. It also lays out the targets used to assist the interpretation of the water quality results for the various parameters.

Table 2.0 Summary of Water Quality Monitoring Program for Enos Lake (PGL, 2016)

Parameter (units)		Water Quality Target	Future Monitoring[a]
Field Parameters (profiles at 1m increments)	Secchi Depth (m)	None – supporting context only	Quarterly sampling[b] at site SWMP-03, starting in 2017 and repeated annually
	Dissolved Oxygen (mg/L and % saturation)	• ≥5 mg/L epilimnion • ≥2 mg/L hypolimnion	Quarterly sampling[b] at site SWMP-03, starting in 2017 and repeated annually
	Conductivity (µS/cm)	None – supporting context only	Quarterly sampling[b] at site SWMP-03, starting in 2017 and repeated annually
	Temperature (°C)	None – supporting context only	Quarterly sampling[b] at site SWMP-03, starting in 2017 and repeated annually
	pH	None – supporting context only	Quarterly sampling[b] at site SWMP-03, starting in 2017 and repeated annually
	Redox (mV)	None – supporting context only	Quarterly sampling[b] at site SWMP-03, starting in 2017 and repeated annually
Laboratory Parameters	*E. coli* (# per mL)	BC Water Quality Guidelines (recreation – secondary contact)[c]	August 2017: 5 times in 30 days. Surface sample from SWMP-03 and any two shoreline locations. Repeat on 5 year increment.
	PAHs (µg/mg)	BC Water Quality Guidelines (freshwater sediments)	August 2017: surface sediment from three locations: SWMP-06, SWMP-04 and SWMP-03.
	Metals (various)	BC Water Quality Guidelines (total metals, freshwater aquatic life). Both average and short-term maximum guidelines apply, where applicable.	February 2017 and August 2017: five samples in a 30 day period. Each sample to occur at three depths from SWMP-03. Sampling to be repeated on five year increments.
	Chlorophyll *a* (µg/L)	Avoid any increase	Quarterly sampling at site SWMP-03, starting in 2017, and repeated annually. Samples to be taken from three depths (surface, mid, deep water)
	Hardness (as $CaCO_3$)	None – required to interpret metals data	February 2017 and August 2017: five samples in a 30 day period. Each sample to occur at three depths from SWMP-03. Sampling to be repeated on five year increments. Data required to interpret metals concentrations.
	Phosphorous (mg/L)	12 µg/L	Quarterly sampling at site SWMP-03, starting in 2017. Samples to be taken from three depths (surface, mid, deep water)

[a]Future monitoring is limited to the scope being taken on by the Developer and will continue until at least one year post build-out within the Enos Lake watershed. It is anticipated that some form of longer term monitoring will be undertaken by RDN in support of long term operation of stormwater infrastructure.
[b]Quarterly sampling is defined as February, May, August, and November.
[c]It is assumed that swimming will not be a recreational use of Enos Lake. If that assumption is incorrect, primary contact guidelines should apply.

2.1 Secchi Depth

Secchi depth is a standard measure of water clarity, providing insight into lake health and productivity from both an aesthetic and ecological perspective. During storm events, it can also be used to qualitatively assess the transport of fine sediment from the watershed into the lake.

The 11 data points collected in 2017 showed substantial variation from 1.4 to 4.8 m with an average of 3 m. Due to the inherent variability in secchi data, Nordin (2017) recommended that the base sampling program include monthly secchi data collection.

In each of 2018 and 2019, only 5 data points were collected, ranging from 2.0 to 3.5 m, and 1.5 to 2.8 m, respectively.

More frequent secchi measurements have been collected in 2020, 2021 and again in 2022.

The data for 2022 ranged from a low of 1.8 m in February to a high of 3.6 m on mid-July. The annual average, based on 17 readings, was 2.7 m compared to 2.7 m in 2020 and 3.0 m in 2021. Overall, the readings were very similar to those taken in the previous 2 years. Low February readings in each year may be indicative of an early spring phytoplankton bloom.

Table 2.1 Secchi depth data for 2022

Date	Secchi (m)	Date	Secchi (m)
February 15	1.8	August 15	2.5
May 16	2.8	August 17	3
May 23	2.6	Augusts 23	2.4
June 22	3.1	August 30	2.3
June 27	3.5	Sept 8	2.7
July 6	3.3	Sept 21	2.7
July 12	3.6	Sept 29	3.1
August 3	3	November 21	2.2
August 10	2.4		

Annual mean 2.7 m

Table 2.2 Summary of Secchi depth data for 2017 – 2022

	2017	2018	2019	2020	2021	2022
No. of readings	11	5	5	10	13	17
Minimum (m)	1.4	2.0	1.5	1.0	0.8	1.8
Maximum (m)	4.8	3.5	2.8	4.3	4.0	3.6
Average (m)	3			2.7	3.0	2.7

2.2 Temperature

Field data collection in 2022 included temperature, dissolved oxygen, pH, conductivity, and redox potential profiles taken quarterly at station 03, the mid-lake sampling station.

Lake temperature has fundamental effects on a lake's seasonal response and susceptibility to watershed activities and disturbance. Thermal stratification is an important factor in understanding fundamental lake ecology and natural processes. Table 2.3 summarizes the lake temperature profiles for 2022.

The mid-February profile shows the lake to be effectively isothermal, unstratified and mixing, ranging from 4.4 to 5 degrees C. By May, the profile indicates a fairly weak thermocline and subsequent stratification reflecting the cool, wet, spring conditions persisting into the early summer of 2022. At that time, the upper 4 meters of Enos Lake was approximately 4 degrees C cooler than in 2021. The somewhat warmer upper layer (epilimnion) was about 4 meters deep overlying a deeper cool layer (hypolimnion). The transition zone between the two layers is known as the thermocline – it is defined by having a change of greater than 1 C per meter of depth change. The overall difference from top to bottom was only 5.2 C, compared to 10.6 C in 2021.

The relatively cool and somewhat wetter conditions persisted into mid-July, when the weather patterns "flipped" to warm and extremely dry through mid-October. Nevertheless, by late June the surface temperatures were in the low 20s, with a steep thermocline beginning at about 3 meters. Through August, the surface temperatures were consistently 24 to 25 °C, with a steep, compressed thermocline reaching 7 to 8 m in depth. On August 16th, the surface water was 16.2 °C warmer than the deepest waters of the lake. The very compressed nature of the August 2022 thermocline reflects the dry and warm summer of 2022.

Table 2.3 shows the consistent nature of the thermocline in Enos Lake through the summer months. The thermocline begins at approximately 3 m from late June through late August. This is fairly typical of small east coast Vancouver Island lakes that have minimal summer inflows and are protected from wind driven mixing. The surface waters warm relatively quickly in the spring, while the steep thermocline effectively isolates the relatively deeper waters of the lake found below the thermocline. As can be seen below the green shading in table 2.3, the hypolimnion of Enos Lake is limited to a fairly narrow band of 3 to 4 m during the summer months.

However, the data collected on September 29th found that the thermocline was showing signs of breaking down, which would then allow the lake water to mix or "turnover". The thermocline had weakened and the hypolimnion temperature had increased by about 3 °C. The warm, dry conditions in September and well into October may have allowed the thermocline to continue somewhat later than normal. The data collected on November 21st, 2022, confirmed that the lake was once again isothermal, unstratified and mixing (it had likely been so for some time).

Table 2.3 Enos Lake temperature profiles for 2022 (temperature °C) **Green shading denotes thermocline**

Depth (m)	Feb 15	May 16	June 22	June 27	July 12	July 22	Aug 10	Aug 15	Aug 22	Aug 17	Aug 23	Aug 30	Sept 8	Sept 21	Sept 29	Nov 21
0.5	5.0	12.6	19.9	22.7	22.4	21.2	24.2	24.0	25	24.5	24.7	23.8	21	18.9	18.5	6.5
1	5.0	12.5	19.9	22.8	22.7	21.2	24.1	23.5	25	24.2	24.6	23.6	20.9	18.7	18.4	6.3
2	5.0	12.5	19.8	22.2	22.3	21.2	24.1	23.3	25.1	24.1	24.4	23.3	20.8	18.5	18.3	6.3
3	4.8	12.4	19.7	20.6	21.6	20.9	23	23.0	25.1	23.8	24.1	23.2	20.8	18.3	18.2	6.3
4	4.7	12.2	17.2	17.9	18.9	18.7	17.9	21.1	21.8	23.1	22	22.8	20.3	18.2	18.1	6.3
4.5								17.4								
5	4.7	10.3	13.4	14.1	15.2	15	14.2	15.4	17.2	16.9	17.7	17.8	17.6	17.7	17	6.3
5.5								13.1								
6	4.7	9.2	11.3	11.2	11.8	11.1	11	12.1	13.4	13.7	12	13	13.4	14.5	15.1	6.2
6.5								10.2								
7	4.7	8.2	9.4	9.2	9.7	9.6	9.2	9.6	10.5	11	10.1	10.5	10.3	10.9	13.2	6.2
8	4.6	7.7	8.5	8.3	8.6	8.4	9.1	8.6	9.7	9.7	9.3	9	9.1	9.6	12.9	6.1
9	4.5	7.5	8	8	8.4	8	9.1	8.2	10.2	9.6	9	8.8	8.6	9.4	12.5	6.0
10	4.5	7.5	7.18	7.8				7.9	10.1	9.3	8.9	8.8	8.4	9.3	12.4	6.0
11	4.4	7.4						7.8					8.3	9.3	12.3	6.0
														9.2		

2.3 Dissolved Oxygen

See tables 2.4, 2.5 and 2.6 for the 2022 data for dissolved oxygen concentrations and percent saturation.

Field data is normally collected as the probes are lowered through the water column. As a check on field data, and to further enhance confidence in the data, field data collection was repeated as the probes were brought back to the surface. This is a simple, yet effective way to assess slow responding probes as they age or foul. The data is shown in Appendix 1. The data for dissolved oxygen was found to be very similar on the way up and the way down in each of the 4 data sets, increasing confidence in the data.

The late February sampling was done when the lake was isothermal with temperatures from 4.4. to 5.0 C (see table 2.3). Dissolved oxygen levels were high, consistently greater than 10.96 mg/L, with saturation from 84.7 to 101.7%. Overall, this reflects isothermal conditions and subsequent mixing throughout the water column. The relatively high saturation levels may once again be influenced by a phytoplankton bloom occurring in the early spring, as indicated by both the chlorophyll a and secchi data. Significant “blooms” can result in daytime oxygen supersaturation in lake waters.

The May sampling indicates a stratified lake with a thermocline between 3 and 7 meters deep, with greater than 88% oxygen saturation to 6 meters. However, the oxygen depletion increases rapidly with increasing depth. The additional data collected by BCCF volunteers in 2022 allows a more detailed look at the conditions in Enos Lake through the summer months. Using the dissolved oxygen target of 2 mg/L as a guide, in May, only the deeper waters of the lake at 11 to 12 m do not meet the target. As the summer progressed, the thermocline became more pronounced and the hypolimnion became more anoxic. As a result, the layer of the lake which does not meet the target of 2 mg/L, gradually works its way up into the thermocline through the summer. On August 15th, this layer reaches a depth of only 6.5 m while in late August through late September it continues to expand upwards to a depth of 6 m.

Decomposition of organic matter in the deeper waters is gradually consuming the oxygen present below the thermocline. It is highly likely that the summer droughts and heat which have occurred over the last two years have exacerbated the lack of oxygen at depth. The steep thermocline and lack of inflow severely limits mixing and oxygen replenishment, particularly at depth. This also makes Enos Lake susceptible to a late summer fish kill if wind induced mixing were to draw deeper anoxic water to the surface.

The late November profile reflects isothermal conditions due to the breakdown of the thermocline with dissolved oxygen levels greater than 8 mg/L throughout the water column and dissolved saturation ranging from 65.9 to 73.9%. While the dissolved oxygen levels meet the targets at all depths, they do remain somewhat lower than usual for the time of year. This may reflect the continuing relatively drier conditions which have prevailed throughout the fall. Inflows and mixing have continued to be limited due to the dry conditions.

In the epilimnion layer (above the thermocline), the water quality target for dissolved oxygen is greater than 5 mg/L. This target was met in each sample set. Below the thermocline in the hypolimnion, the target is 2 mg/L. This target was not met from late spring through early fall. The late August through late September data was particularly concerning as the lake was virtually anoxic below the mid-point of the thermocline. This is indicative of a productive lake with insufficient mixing/inflow, substantial organic decomposition at depth, as well as internal loading and subsequent release of phosphorus from the sediments.

Table 2.4 Enos Lake dissolved oxygen profiles for 2022 (mg/L) yellow shading denotes area of lake below D.O. threshold of 2 mg/L

Depth (m)	Feb 15	May 16	June 22	June 27	July 12	July 22	Aug 10	Aug 15	Aug 17	Aug 22	Aug 23	Aug 30	Sept 8	Sept 21	Sept 29	Nov 21
0.5	12.92	10.0	8.8	8.57	8.38	8.36	8.4	7.98	8.82	8.46	8.79	8.57	8.35	8.6	9	8.66
1	12.26	10.2	8.85	8.62	8.37	8.32	8.93	7.96	8.89	8.44	8.83	8.61	8.25	8.48	8.78	9.11
2	12.26	10.3	8.65	8.64	7.88	8.05	8.91	7.08	8.88	8.43	8.79	8.52	8.18	8.44	8.68	8.88
3	12.05	10.2	8.83	8.69	8.06	8.06	6.62	6.79	8.89	8.4	8.57	8.23	8.21	8.42	8.63	8.50
4	12.38	10.2	8.95	8.81	7.95	7.79	10.1	7.61	8.7	10.55	9.5	7.92	7.98	8.34	8.48	9.13
4.5								6.97								
5	11.86	11.0	9.38	9.52	8.23	9.66	7.5	6.33	6.36	9.03	4.84	3.92	2.25	6.68	5.6	8.40
5.5								6.06								
6	11.90	10.1	8.8	9.21	8.23	7.51	2.03	3.58	4.6	6.88	1.37	0.96	0.56	2.1	1.15	8.45
6.5								1.16								
7	11.93	5.3	6.18	5.52	5.4	4.95	-0.07	0.20	1.35	3	0.16	0.12	0.21	0.68	0.4	8.43
8	12.01	3.6	2.05	0.42	0.65	-0.03	-0.07	0.10	0.39	0.27	-0.1	-0.06	0.07	0.33	0.22	8.42
9	10.96	2.8	0.13	0.06	0.01	-0.13	-0.016	0.08	0.03	0.07	-0.13	-0.12	0.01	0.2	0.07	8.41
10	11.27	2.2	0.01	-0.05				0.08	-0.07	-0.02	-0.15	-0.13	-0.04	0.06	0.03	8.42
11	11.24	1.0						0.07					-0.06	0.01	-0.01	8.11
12		0.6												-0.02		

Table 2.5 Enos Lake temperature profiles (°C) for 2022 showing thermocline and area of lake below D.O. threshold of 2 mg/L
Green shading denotes thermocline **red numerals denote area of lake below D.O. threshold of 2 mg/L**

Depth (m)	Feb 15	May 16	June 22	June 27	July 12	July 22	Aug 10	Aug 15	Aug 22	Aug 17	Aug 23	Aug 30	Sept 8	Sept 21	Sept 29	Nov 21
0.5	5.0	12.6	19.9	22.7	22.4	21.2	24.2	24.0	25	24.5	24.7	23.8	21	18.9	18.5	6.5
1	5.0	12.5	19.9	22.8	22.7	21.2	24.1	23.5	25	24.2	24.6	23.6	20.9	18.7	18.4	6.3
2	5.0	12.5	19.8	22.2	22.3	21.2	24.1	23.3	25.1	24.1	24.4	23.3	20.8	18.5	18.3	6.3
3	4.8	12.4	19.7	20.6	21.6	20.9	23	23.0	25.1	23.8	24.1	23.2	20.8	18.3	18.2	6.3
4	4.7	12.2	17.2	17.9	18.9	18.7	17.9	21.1	21.8	23.1	22	22.8	20.3	18.2	18.1	6.3
4.5								17.4								
5	4.7	10.3	13.4	14.1	15.2	15	14.2	15.4	17.2	16.9	17.7	17.8	17.6	17.7	17	6.3
5.5								13.1								
6	4.7	9.2	11.3	11.2	11.8	11.1	11	12.1	13.4	13.7	12	13	13.4	14.5	15.1	6.2
6.5								10.2								
7	4.7	8.2	9.4	9.2	9.7	9.6	9.2	9.6	10.5	11	10.1	10.5	10.3	10.9	13.2	6.2
8	4.6	7.7	8.5	8.3	8.6	8.4	9.1	8.6	9.7	9.7	9.3	9	9.1	9.6	12.9	6.1
9	4.5	7.5	8	8	8.4	8	9.1	8.2	10.2	9.6	9	8.8	8.6	9.4	12.5	6.0
10	4.5	7.5	7.18	7.8				7.9	10.1	9.3	8.9	8.8	8.4	9.3	12.4	6.0
11	4.4	7.4						7.8					8.3	9.3	12.3	6.0
12														9.2		

Table 2.6 Enos Lake Dissolved Oxygen saturation profiles for 2022 (from Standard Methods for the examination of water and wastewater) – provided by BCCF

Profile - Site SWMP-03 dissolved oxygen (% saturation)				
	2/15/2022	5/16/2022	8/15/2022	11/21/2022
Depth (m)	D.O. (%saturation)	D.O. (%saturation)	D.O. (%saturation)	D.O. (%saturation)
0.5	101.7	94.2	95.8	70.4
1	96.0	95.6	93.8	73.8
2	95.9	96.5	82.7	72.0
3	94.0	95.1	78.9	69.5
4	96.3	94.8	86.2	73.9
4.5			73.0	
5	92.2	97.2	63.6	68.0
5.5			57.5	
6	92.4	88.3	33.0	68.3
6.5			10.5	
7	92.7	45.1	1.8	68.4
8	93.0	30.2	0.8	67.8
9	84.7	23.9	0.7	67.6
10	86.9	18.7	0.6	67.7
11	86.7	8.3	0.5	65.9
12		4.8		

2.4 Conductivity

As a simple measure of dissolved ions in the water, conductivity is a general indicator of lake health and watershed disturbance, in support of other data.

The profile for late February when the lake was not stratified showed minimal variability ranging from 122.7 to 123.9 µS/cm. In May, conductance ranged from 125.8 µS/cm to 135.0 µS/cm. In August, conductance behaved differently, exhibiting 3 fairly distinct layers; the epilimnion above the thermocline was consistently at 140.8 to 141.0 µS/cm, before decreasing through the thermocline ranging from 130.9 µS/cm to 134.5.0 µS/cm. Below the thermocline, conductance steadily increased from 134.5 µS/cm at 7m to 156.4 µS/cm at 11 m. In November, the lake was once again effectively isothermal, and conductance showed minimal variability ranging from 136.7 µS/cm to 137.6 µS/cm . While there is some year-to-year variability, the overall trends appear to be similar from year to year. The relative lack of summer rain and inflow to the lake produces a strong thermocline, which limits vertical mixing in the lake. Decomposition in the hypolimnion results in anoxic or near anoxic conditions at depth, which in turn results in internal loading of phosphorus. Evaporation at the lake surface results in an increase in conductance, while an accumulation of dissolved ions and organic matter at depth increases conductance in the hypolimnion. While the thermocline did breakdown through the fall, the overall somewhat higher conductance throughout the water column in late November reflects the lack of precipitation, flushing and replenishment that normally occurs by then.

Overall, conductivity appears to be within the range to be expected for this area, given the precipitation, watershed runoff and previous data (Nordin, 2017).

Table 2.7 Enos Lake conductivity profiles for 2022

Profile - Site SWMP-03				
	2/15/2022	5/16/2022	8/15/2022	11/21/2022
Depth (m)	Conductivity (µS/cm)	Conductivity (µS/cm)	Conductivity (µS/cm)	Conductivity (µS/cm)
0.5	122.8	127.0	141.0	136.8
1	122.8	127.1	141.0	136.7
2	122.7	126.8	140.8	136.9
3	122.8	126.9	140.9	136.8
4	122.7	127.0	137.3	137.0
4.5			131.7	
5	122.9	125.8	130.9	137.0
5.5			131.5	
6	122.9	126.0	132.7	137.1
6.5			132.6	
7	122.8	128.8	134.5	137.1
8	122.9	130.2	144.0	137.1
9	123.4	131.0	151.2	137.1
10	123.8	131.4	155.5	137.1
11	123.9	133.6	156.4	137.6
12		135.0		

2.5 pH

Enos Lake pH data is summarized in table 2.9 below

A field data check as the probes were brought back to the surface was used to assess potentially slow responding probes as they age or foul. The data is shown in Appendix 1. The pH data for both February and May were quite different on the way up and way down, indicating possible calibration issues or more likely that the probe was not responding well. As a result, the pH data for February and May was not used. In contrast, the August and November data proved to be very similar on the way up and down.

In August 2022, pH ranged from 8.08 at the surface to 7.9 above the thermocline, before declining through the thermocline to 6.72 at 7 m, and remaining consistent to the lake bottom at 11 m. This was very similar to what was observed in both 2020 and 2021. This may be related to phytoplankton blooms, gradual oxygen depletion and internal loading at depth. In eutrophic lakes, photosynthesizing phytoplankton blooms can raise pH levels in the surface waters. At depth, the bacterial decomposition of organic matter consumes oxygen and releases acidic byproducts, which can cause pH to decrease.

In November, the lake had returned to isothermal conditions, with a very slight pH fluctuation down to 11 meters in depth. There was a decrease of less than 0.1 pH units to 7.21 at 11 meters.

Table 2.8 Enos Lake pH profiles for 2022

Profile - Site SWMP-03		
	8/15/2022	11/21/2022
Depth (m)	pH (pH units)	pH (pH units)
0.5	8.08	7.28
1	8.12	7.28
2	8.10	7.25
3	7.90	7.24
4	7.60	7.24
4.5	7.04	
5	6.94	7.24
5.5	6.89	
6	6.82	7.23
6.5	6.72	
7	6.72	7.21
8	6.72	7.20
9	6.74	7.22
10	6.75	7.21
11	6.75	7.21
12		

2.6 Redox

Redox potential (sometimes referred to as ORP) measures the lake's ability to be in balance while breaking down organic waste products such as dead and decaying plant matter and plankton. When redox values remain higher, there is lots of oxygen in the water reflecting a balance between lake productivity, watershed health and available oxygen. In general, the higher the redox values, the healthier the lake is, so that bacteria can break down organic matter more efficiently. However, even in healthy lakes, there is generally less oxygen as you approach the bottom sediments, a reflection of the bacterial activity in the sediments.

Over time, there can be an accumulation of slowly decomposing organic matter on the lake bottom, which will further drive the redox and oxygen levels down. This is not a healthy environment for fish or other aquatic organisms. In healthy lakes, redox potential values often range from 300 to 500 mV. In poorly oxygenated water, such as the deeper water of stratified lakes or the sediment of eutrophic lakes, the redox potential will be low (less than 100 mV or even negative values). When redox is low, dissolved oxygen is low, and phosphorus is released from the sediments. This is often referred to as "internal loading" of phosphorus, a process which further exacerbates the eutrophication of lakes, making recovery more difficult. Enos Lake is particularly susceptible to internal loading due to its strong summer thermocline, which limits vertical mixing, and lack of significant summer inflows due to the generally dry summers typical of the area.

While phosphorus is released from the sediments into the water column during the summer months, it is reabsorbed by the sediments when the thermocline breaks down as the lake cools and mixes during the fall. The process repeats itself annually, as it recycles much of the phosphorus through the lake.

While redox potential can only be measured in the field, it can frequently be a challenge. Redox reactions are slow to equilibrate in the natural environment so that the readings are often considered "semi-quantitative". Probes need frequent maintenance, can have a relatively short shelf life, and can become very slow to respond in the field as they age.

A field data check as the probes were brought back to the surface was used to assess potentially slow responding probes as they age or foul. The data is shown in Appendix 1. The "way up and way down" comparisons illustrate the challenges when measuring redox, as the data was significantly different, likely due to a very slow responding probe. This is best illustrated in the August 15th data as the redox decreases substantially in the deeper waters of the lake. On the way back up, the probe does not recover, continuing to measure very low redox. As a result, the redox data collected in 2022 has been placed in appendix 1 c) and will not be included in the interpretation portion of this report.

2.7 Chlorophyll a

Enos Lake chlorophyll a data is summarized in table 2.9 and figure 1 below

Chlorophyll a is a measure of the algal pigments in lake water and is used to assess overall lake biological productivity.

In 2022, 7 of 12 samples were higher than 10 ug/L, including 7 of the 9 samples in May through November, with the highest daily mean occurring in November. The steep thermocline and lack of oxygen at depth in August resulted in significant release of phosphorus from the sediments of Enos Lake. This phosphorus remained effectively isolated in the deeper waters of the lake until well into the fall, when the lake "turned over." The late September field profiles showed that the thermocline was beginning to weaken. By late November, the lake was once again isothermal, allowing mixing of the deeper, relatively phosphorus rich waters of the lake. Due to the lack of significant fall rains, the lake has not been "flushed" by replenishing surface water. As a result, the phosphorus has likely produced a phytoplankton bloom. This is supported by the secchi depth reading of only 2.2 m, one of the lowest of the year. The annual chlorophyll a mean is the highest measured since the program began in 2017, but remains very similar to that found in 2017 and 2018,

General trophic status classification using chlorophyll a is based on: <2 ug/L indicates an oligotrophic lake; 2 to 7 ug/L indicates a mesotrophic lake; >7ug/L indicates a eutrophic lake. Enos Lake's 2022 mean concentration of 10.71 ug/L was indicative of a eutrophic or productive lake, as was the case in 2017 and 2018.

A further target for Enos Lake was to avoid any increase in chlorophyll a over time. Based on the data gathered over the last 6 years, this target has thus far been met.

Table 2.9 a) Enos Lake chlorophyll a data for 2022

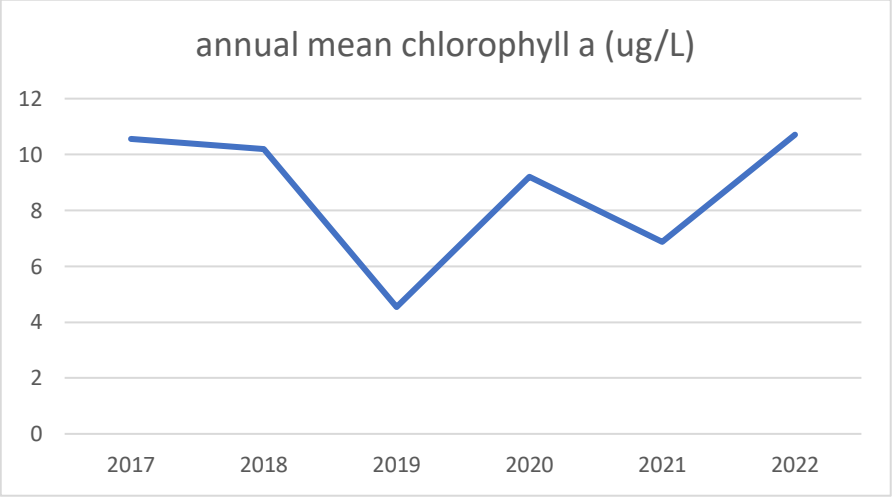
SWMP-03 - chlorophyll a ug/L				
	2/15/2022	5/16/2022	8/15/2022	11/21/2022
Depth (m)				
1	8.56	8.18	5.78	16.6
5	7.10	15.2	10.2	14.0
10	8.15	11.60	10.4	12.7*
Daily mean	**7.94**	**11.66**	**8.8**	**14.43**
Annual mean				**10.71**

*average of 2 samples

Table 2.9 b) Enos Lake Daily and Annual mean chlorophyll a data for 2017 to 2022

SWMP-03 - chlorophyll a ug/L DAILY MEAN AND ANNUAL MEAN					
	FEBRUARY	MAY	AUGUST	NOVEMBER	ANNUAL MEAN
2017	11.9	9.82	13.78	6.69	10.55
2018	8.6	8.4	12.4	11.5	10.2
2019		6.61	4.14	2.87	4.54
2020	10.3	2.69	10.9	12.9	9.2
2021	7.73	4.27	6.85	8.65	6.87
2022	7.94	11.66	8.8	9.43	10.71

Figure 1. Annual mean chlorophyll a over time in Enos Lake



2.8 Phosphorus

In lakes, phosphorus is an important nutrient and a key indicator of lake productivity. Excessive phosphorus can result in significant algal blooms and subsequent low dissolved oxygen levels, impacts on drinking water, fish health and recreational use. The water quality target for Enos Lake appears to be an annual average total phosphorus of 12 ug/L. In 2022, the annual average of 14.4 ug/L did not meet the target, for the first time since 2018.

In 2017 and 2018, very high phosphorus values were found through the summer and fall, particularly at depth, likely an indication of a prolonged oxygen deficit in the hypolimnion and subsequent internal loading of phosphorus from the lake sediments. Concentrations between 20 and 40 ug/L were not uncommon. In 2022, relatively higher concentrations were measured throughout the water column in May (13.4 to 17.3 ug/L). In August, total phosphorus was at 18.4 ug/L at 5 meters, increasing to 33.3 ug/L at depth, reflecting internal loading of phosphorus. In November, levels had decreased to 11.7 to 14.1 ug/L, still somewhat elevated, reflecting the lack of overall flushing through the fall.

From 2019 through 2021, there had been no phosphorus measurements higher than 20 ug/L. In both 2019 and 2020, the summer weather included reasonable precipitation which would have provided some inflow and limited surface replenishment. In 2021, on the other hand, there was virtually no rain from mid-June through mid-September. In 2022, the weather was cool and damp through mid-July, before switching completely to dry and warm well into the fall. By late November, precipitation remained significantly below that typical for the area. It would appear that phosphorus levels had remained lower for 3 years, before increasing in 2022.

Another method of evaluating lake trophic status is based on the overall assessment of total phosphorus. In lakes with longer residence times (>1 year), the assessment is based on concentrations at spring overturn, prior to the establishment of a thermocline. In lakes with shorter residence times (<1 year), it is based on an annual mean. Lakes are considered to be oligotrophic if total phosphorus is less than 10 ug/L; mesotrophic when ranging from 10 to 30 ug/L; and eutrophic when greater than 30 ug/L. Using this assessment method, Enos Lake would generally be considered mesotrophic from 2017 through 2022, with the exception of 2019 when it would be classified as oligotrophic.

Table 2.10 Enos Lake total phosphorus data for 2022

Site SWMP-03 - total Phosphorus ug/L				
	2/15/2022	**5/16/2022**	**8/15/2022**	**11/21/2022**
Depth (m)				
1	9.7	15.0	9.1	14.1
5	8.9	13.4	18.4	11.7
10	9.2	17.3	33.3	13.0*
Annual mean	14.4			

*average of 2 samples

Table 2.11 Enos Lake orthophosphate data for 2022

Site SWMP-03 – Orthophosphate ug/L				
	2/15/2022	5/16/2022	8/15/2022	11/21/2022
Depth (m)				
1	1.1	No data	<1	<1
5	<1	No data	1.2	<1
10	1.3	No data	<1	<1

Figure 2. annual mean total phosphorus over time in Enos Lake

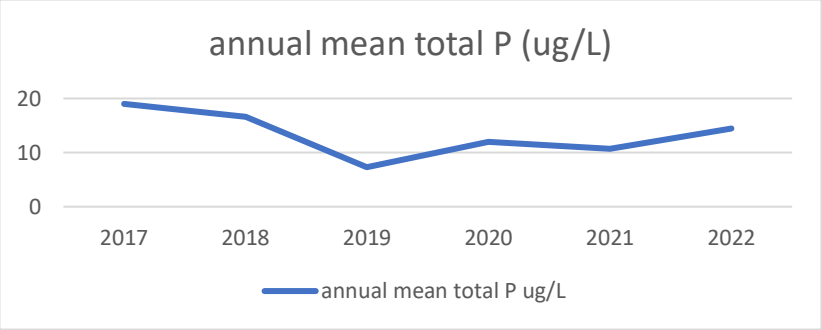


Table 2.12 Annual Mean total phosphorus in Enos Lake

Site SWMP-03 – total phosphorus ug/L					
ANNUAL MEAN					
2017	2018	2019	2020	2021	2022
19	16.6	7.3	12.0	10.7	14.4

3.0 Discussion – water column and lake productivity

The primary intent of the annual portion of the Enos Lake monitoring program is to gain insight into the current status and trends in lake productivity. This is important in that watershed disturbance and land use, together with climate change impacts, have the potential to shift the lake's trophic status. As lakes become more eutrophic (more biologically productive), algal blooms (including blue green algal blooms) can become more prevalent leading to lower dissolved oxygen levels, impaired water quality, and impacts on recreational use and drinking water. There are examples of lakes on the east coast of Vancouver Island and the Gulf Islands where this has occurred. Once lakes become eutrophic or hypereutrophic, it is very difficult to reverse this process. Prevention is a far more effective tool in protecting lake water quality.

The summer of 2022 was unusual in that relatively wetter, cooler conditions persisted through mid-July, followed by an extreme drought until mid to late October. While the worst of the drought ended in late

October, stream flows remained significantly lower than normal through early December. This was the second successive summer characterized by extreme drought, resulting in a very steep and compressed thermocline through the summer. While the epilimnion dissolved oxygen target was met, the hypolimnion target was once again not met, from May through at least the end of September. As seen in 2021, the virtually anoxic zone extended well up into the thermocline. The extra field profile data collected by BCLSS volunteers in 2022 showed that this persisted from mid-August through to the end of September.

This has not been seen prior to 2021. If this continues or worsens, the lack of oxygen through the thermocline may make Enos Lake susceptible to a late summer "fish kill" given the right atmospheric conditions: low atmospheric pressure and windy conditions in late summer may bring relatively shallow anoxic water to the surface. The resulting mixing could result in low oxygen levels throughout the water column. If fish cannot find a layer of sufficient oxygen, a "fish kill" may occur.

Chlorophyll a, total phosphorus and secchi depth are fundamental indicators used to assess lake trophic status. The secchi depth data has consistently suggested that Enos Lake is eutrophic or on the edge of mesotrophic and eutrophic. Total phosphorus continues to accumulate at depth due to internal loading, from spring through early fall. The difference in 2022 is the extent, timing, and duration of the summer drought. In 2021, the extreme summer drought ended in mid-September, as rainfall allowed the lake to gradually "turnover" while replenishing and flushing the lake. In 2022, the summer drought began in mid-July, persisting through mid to late October. While the lake had "turned over" as shown in the November field profile, there had not been sufficient rainfall to replenish and flush the lake. As a result, phosphorus continued to accumulate much later into the fall, and had not yet been flushed out by late November. Concentrations in 2022 approached the levels found in 2017 and 2018, after 3 years of lower phosphorus levels.

Mean annual average chlorophyll a data for 2022 classified Enos Lake as eutrophic. For the first time since 2018, the total phosphorus target of 12 ug/L was not met, although the annual average suggested that Enos Lake was a mesotrophic lake. Not surprisingly, chlorophyll a and total phosphorus appear to be following a similar pattern over the last 5 years. The highest concentrations were in 2017 and 2018, followed by a substantially lower value in 2019 and more moderate levels in 2020 and 2021, before increasing again in 2022. However, it appears that Enos Lake is mesotrophic to eutrophic, with annual climatic condition that can shift the lake to more eutrophic conditions. The overarching target of no increase in chlorophyll a over time is currently being met.

Table 3.1 Year to year status of key indicators and targets

*Preliminary assessment as insufficient data collected

	2017	2018	2019	2020	2021	2022
Secchi	Mesotrophic to eutrophic	eutrophic*	eutrophic*	eutrophic	Mesotrophic to eutrophic	eutrophic
Dissolved oxygen at epilimnion – target of >5 mg/L	Target met	Target met	Target met	Target met	Target met	Target met
Dissolved oxygen at hypolimnion – target of >2 mg/L	Target not met	Target not met	Target not met	Target not met	Target not met	Target not met
Chlorophyll a	eutrophic	eutrophic	mesotrophic	eutrophic	mesotrophic	eutrophic
Chlorophyll a	No increase over time					
Total phosphorus target of 12 ug/L	Target not met – indicates mesotrophic	Target not met – indicates mesotrophic	Target met – indicates oligotrophic	Target just met- Indicates mesotrophic	Target met – indicates mesotrophic	Target not met – indicates mesotrophic

Weather patterns for the summers of 2021 and 2022 were extreme, with extended droughts and higher temperatures. It is anticipated that summers such as this will become more common due to climate change. In a typical summer, the dissolved oxygen target at depth is not met. During the prolonged summer droughts of the last 2 years, the lack of oxygen at depth progressed well upwards into the thermocline, potentially making Enos Lake susceptible to a "fish kill". It is not known if the conditions observed this year have occurred in the past. Regardless, they are likely to re-occur more frequently in upcoming years. The lack of fall rain in 2022 likely impacted the conditions seen in Enos Lake over the last few years, resulting in more eutrophic conditions.

While there is year-to-year variability in Enos Lake water quality, there are a number of constants: strong summer stratification; low dissolved oxygen at depth, and internal loading of phosphorus during the summer months. Secchi depth, chlorophyll a and total phosphorus levels appear to indicate that Enos Lake is moderately productive, hovering between mesotrophic and eutrophic.

Existing water quality and increasing climactic extremes make Enos Lake very susceptible to watershed disturbance impacts. If Enos Lake gradually becomes more eutrophic to hyper-eutrophic, it will be very difficult to restore the lake. Coupled with summer droughts, fish kills could become more likely. It is far more effective to apply preventative best management practices to protect and maintain Enos Lake water quality.

4.0 Bacteriological indicators

Every 5 years, during the summer, the surface waters of Enos Lake are sampled for E. coli at 3 locations (see Table 4.1). The sampling occurs weekly for 5 consecutive weeks (i.e. 5 samples within 30 days). The purpose of the sampling is to assess the lake for potential fecal contamination which could impact primary recreational use such as swimming. The BC water quality guidelines (BC Approved Water Quality Guidelines, 2021) of a geometric mean of 200/100 mL based on 5 samples in 30 days, or no individual result higher than 400/100 mL were easily met in all samples taken in both 2017 and 2022.

Table 4.1 E. coli data for Enos Lake

Enos Lake E. coli data (no./100 mL)			
	SWMP-06	SWMP-04	SWMP-03
24-Aug-2017	5	9	1
29-Aug-2017	7	7	1
5-Sep-2017	21	3	1
11-Sep-2017	31	6	6
14-Sep-2017	5	7	9
2017 geometric mean	**10**	**6**	**2**
2-Aug-2022	1	0	0
9-Aug-2022	2	1	1
15-Aug-2022	1	0	2
23-Aug-2022	7	9	1
29-Aug-2022	6	8	1
2022 geometric mean	**2**	**2***	**1***

*for purposes of calculating geometric mean zero values were replaced with 1/100 mL

5.0 Metals in Enos Lake

Every 5 years, weekly sampling for metals (5 times in 30 days) is done at three depths (1, 5 and 10 meters) in early spring and again in midsummer. In 2017, with the exception of March 2nd, the data is for dissolved metals only, with the exception of March 2nd when the analysis included both total and dissolved metals. In 2022, all of the data was for total metals only.

The BC water quality guidelines (Table 5.1) are largely based on total metals with a few exceptions. Most have an acute or maximum guideline, as well as a chronic guideline based on the average of 5 samples taken within 30 days. Since the majority of the data is well within the guidelines at all depths, and there is generally minimal variability throughout the water column, the data has been summarized in tables 5.2 and 5.3. The discussion below is limited to the metals that show variability with depth or those that potentially exceed the guidelines, requiring further interpretation.

Table 5.1 Summary of Applicable BC water quality guidelines (British Columbia Ministry of Environment and Climate Change Strategy. 2021)

	BC water quality guideline for aquatic life – total metals unless specified otherwise	
	Chronic (average) maximum (ug/L)	Short term acute (maximum) (ug/L)
Aluminum (Al)	50 dissolved Al	100 dissolved Al
Arsenic (As)	-	5
Boron (B)	1200	
Cadmium (Cd)	0.127	0.288
Cobalt (Co)	4	110
Copper (Cu)	Estimated at 0.4 dissolved Cu*	Estimated at 2.3 dissolved Cu*
Iron (Fe)	350	1000
Lead (Pb)	4.6**	33.8**
Manganese (Mn)	825**	1091**
Mercury (Hg)		
Molybdenum (Mo)	7600	46000
Selenium (Se)	2	
Silver (Ag)	0.05**	0.1**
Zinc (Zn)	7.5**	33**

* based on hardness of 30 mg/L, pH of 7 and DOC of 3.0 mg/L

** based on hardness of 50 mg/L

5.1 Aluminum

The water quality guideline for aluminum is based on dissolved aluminum only. For freshwater with a pH $\geq$6.5, the chronic guideline is 50 ug/l while the acute guideline is 100 ug/L. In 2017, dissolved aluminum was well below the guidelines in all samples. In 2022, the data was limited to total aluminum only, which would over estimate the amount of dissolved aluminum in the water column. In February 2022, the total aluminum average of 60.18 ug/L exceeded the dissolved aluminum chronic guideline of 50 ug/L. The acute guideline of 100 ug/L was met in February, while both guidelines were met in August 2022.

On March 2nd, 2017, data for both dissolved and total aluminum is available. At that time, dissolved aluminum was only 39 to 49 % of total aluminum. Using that as an example, it is likely that the dissolved aluminum levels in February 2022 would have been substantially lower than total aluminum, and likely would have met the chronic guideline. This is further supported by the elevated turbidity in the August 15th, 2022 sample at 10 meters (Table 5.4), which indicates higher particulates in the deeper waters of the lake.

5.2 Copper

The calculation of the BC guideline for dissolved copper is more complex. The major factors influencing dissolved copper toxicity are dissolved organic carbon (DOC), hardness, and pH. The biotic ligand model is used to calculate appropriate dissolved copper guideline for the specific water body. In addition, the background or baseline concentration of copper must also be considered as mineralogy can influence baseline levels. It is beyond the scope of this report to use the biotic ligand model as no DOC data has been collected.

To get an **approximation** of what the guideline for copper might be for Enos Lake, a pH of 7.0, temperature of 15 C, and DOC of 3.0 mg/L was used to calculate an approximate chronic guideline of 0.4 ug/L and an approximate acute guideline of 2.3 ug/L dissolved copper. Using this as an estimate, the dissolved copper levels in March and August 2017 exceeded the chronic guideline. The total copper levels in 2022, which likely overestimate dissolved copper, exceeded both the estimated chronic and acute guideline in 2022. While this is useful as a hypothetical exercise, it remains of limited use without DOC and dissolved copper data.

Table 5.2 Summary of 2017 Metals data for Enos Lake

Dissolved Metals by ICPMS - at SWMP03	Units	March 2017 average	March 2017 maximum	August 2017 average	August 2017 maximum
Dissolved Aluminum (Al)	ug/L	21.33	24.00	16.52	29.40
Dissolved Arsenic (As)	ug/L	0.14	0.15	0.17	0.19
Dissolved Boron (B)	ug/L	<50	<50	<50	<50
Dissolved Cadmium (Cd)	ug/L	0.02	0.02	<0.01	<0.01
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.25	0.29
Dissolved Copper (Cu)	ug/L	1.05	2.23	0.57	1.10
Dissolved Iron (Fe)	ug/L	112	120	347	1420
Dissolved Lead (Pb)	ug/L	1.51	5.69	0.22*	0.29
Dissolved Manganese (Mn)	ug/L	23.61	27.60	325.22	726.00
Dissolved Mercury (Hg)	ug/L	<0.05	<0.05		
Dissolved Molybdenum (Mo)	ug/L	1.40	1.40	<1.0	<1.0
Dissolved Selenium (Se)	ug/L	<0.1	<0.1	<0.10	<0.10
Dissolved Silver (Ag)	ug/L	<0.02	<0.02	<0.020	<0.020
Dissolved Zinc (Zn)	ug/L	8.41	18.70	6.94*	15.20
*average values calculated using less than values i.e. they are an overestimate					

Table 5.3 Summary of 2022 Metals data at all depths for Enos Lake

Total Metals by ICPMS - at SWMP03	Units	February 2022 average	February 2022 maximum	August 2022 average	August 2022 maximum
Total Aluminum (Al)	ug/L	60.18	83.10	27.18	44.70
Total Arsenic (As)	ug/L	0.18	0.23	0.24	0.35
Total Boron (B)	ug/L	19.45	21.00	21.40	25.00
Total Cadmium (Cd)	ug/L	<0.005	<0.005	0.005*	0.01
Total Cobalt (Co)	ug/L	0.10	0.10	0.16*	0.25
Total Copper (Cu)	ug/L	1.71	2.97	1.46	2.84
Total Iron (Fe)	ug/L	149	167	931	3580
Total Lead (Pb)	ug/L	0.46	1.46	0.55	1.74
Total Manganese (Mn)	ug/L	26.74	28.70	123.22	411.00
Total Mercury (Hg)	ug/L	<0.005	<0.005	<0.005	<0.005
Total Molybdenum (Mo)	ug/L	0.19	0.23	0.18	0.23
Total Selenium (Se)	ug/L	0.08	0.12	0.077*	0.10
Total Silver (Ag)	ug/L	<0.01	<0.01	<0.01	<0.01
Total Zinc (Zn)	ug/L	4.1*	8.60	6.02*	26.30
*average values calculated using less than values i.e. they are an overestimate					

Table 5.4 Enos Lake Turbidity data for 2022

Turbidity (NTUs)			
	SWMP03-1M	SWMP03-5M	SWMP03-10M
01-Feb-22		1.5	
08-Feb-22		1.4	
15-Feb-22		1.25	
22-Feb-22		1.43	
28-Feb-22		1.38	
02-Aug-22		1.37	
09-Aug-22		1.39	
15-Aug-22	1.11	1.23	3.08
23-Aug-22		1.44	
29-Aug-22		1.4	

5.3 Iron and Manganese

Both iron and manganese follow different trends than other metals in Enos Lake. During the spring, when the lake is isothermal and oxygen is plentiful, manganese and iron concentrations remain relatively low, similar at all depths and well below BC water quality guidelines. During the summer, both iron and manganese accumulate at depth (Table 5.5). For example, in August 2022, total iron at 10 meters averaged 40 to 50 times higher than that found at 1 or 5 meters. Similarly, total manganese at 10 meters averaged 8 to 11 times higher than that measured at 1 or 5 meters. While manganese continued to meet the BC guidelines, total iron at depth in both 2017 and 2022 did not.

The increase of both iron and manganese in the hypolimnion during the summer is driven by the lack of oxygen and subsequent reducing conditions. Under aerobic conditions, phosphate ($PO4^{3-}$) is adsorbed or precipitated with ferric (Fe^{3+}) iron oxyhydroxides, drawing both phosphorus and iron into the sediment. To a lesser extent, manganese can also play a role in phosphorus retention in the sediment. However, during the summer in Enos Lake, the hypolimnion is virtually anoxic which subsequently releases phosphorus, as well as iron and manganese, into the deeper waters below the thermocline. In the fall, when the thermocline once again breaks down and the hypolimnion oxygen is replenished, much of the phosphorus and iron would re-adsorb or precipitate out, and subsequently return to the sediment of Enos Lake.

Table 5.5 Summary of Iron and Manganese data for Enos Lake

Total Metals by ICPMS - at SWMP03	Units	1 meter		5 meters		10 meters	
		average	maximum	average	maximum	average	maximum
March 2017							
dissolved manganese	ug/L	24	27	24	28	24	28
dissolved iron	ug/L	112	120	112	120	111	118
August 2017							
dissolved manganese	ug/L	<1	<1	13	58	572	726
dissolved iron	ug/L	13.9	16.1	146	167	980	1420
February 2022							
total manganese	ug/L	26	27	27	28	27	29
total iron	ug/L	147	162	149	167	152	163
August 2022							
total manganese	ug/L	30	39	43	59	330	411
total iron	ug/L	59	71	72	90	2946	3580

5.4 Zinc

Zinc concentrations generally met the BC water quality guideline, with one possible exception. In March 2017, the average dissolved zinc level of 8.4 ug/L was just above the total zinc guideline of 7.5 ug/l. However, 8 of the 12 values were <5 ug/L. A conservative approach was used to calculate the average in table 5.2 as each "less than value" was converted to 5 ug/L, overestimating the average. Another frequently used method of calculating the average when "less than values" are included is to divide the value in half i.e. <5 becomes 2.5 ug/L. This approach would reduce the average dissolved zinc to 6.5 ug/L, meeting the BC guideline. It is important to note that the zinc data for 2022 met the BC water quality guidelines.

6.0 PAHs in Sediment

PAHs are to be sampled in Enos Lake sediment from three locations (sites SWMP03, SWMP04 and SWMP06) every 5 years (Table 6.1). PAHs are indicators of hydrocarbon presence or contamination as well as general combustion products, including those of forest fires. BC sediment quality guidelines are in place for a number of PAHs, based on % organic carbon in the sediment . The sediment criteria listed in Table 6.2 are based on 1.0% organic carbon content. For sediment with an organic carbon content other than 1%, an appropriate criterion can be calculated by multiplying the recommended criterion by the actual organic carbon content of the sediment (e.g. if the sediment organic carbon is 3%, multiply the criteria in Table 6.2 by a factor of 3).

Many of the PAHs were found at detectable concentrations in 2017, and again at 03 in 2022. However, high moisture content in the samples collected in August 2022 at sites 04 and 06 resulted in substantially higher detection limits. Interpretation of the information is difficult as there is no organic carbon data available to calculate the appropriate sediment criteria for Enos Lake. While PAHs are present in the

sediment, their source is unknown. It is also unknown whether the deposition of the PAHs in the sediment is recent or historical.

Table 6.1 Summary of PAH data for sediment samples in Enos Lake

August 29, 2017		**SWMP06**	**SWMP04**	**SWMP03**
Acenaphthene	mg/kg	<0.0058 (1)	0.0055 (1)	<0.0084 (1)
Acenaphthylene	mg/kg	<0.0058 (1)	<0.0051 (1)	<0.0084 (1)
Anthracene	mg/kg	<0.012 (1)	0.012 (1)	0.039 (1)
Benzo(a)anthracene	mg/kg	<0.012 (1)	<0.010 (1)	0.022 (1)
Benzo(a)pyrene	mg/kg	<0.012 (1)	0.012 (2)	0.031 (2)
Benzo(b)fluoranthene	mg/kg	0.023 (2)	0.044 (1)	0.076 (1)
Benzo(g,h,i)perylene	mg/kg	<0.023 (1)	0.046 (1)	0.091 (1)
Benzo(k)fluoranthene	mg/kg	<0.012 (1)	0.014 (1)	0.028 (1)
Chrysene	mg/kg	0.030 (1)	0.015 (1)	0.041 (1)
Dibenz(a,h)anthracene	mg/kg	<0.0058 (1)	0.0055 (2)	<0.0084 (1)
Fluoranthene	mg/kg	0.051 (1)	0.067 (1)	0.11 (1)
Fluorene	mg/kg	0.021 (2)	0.011 (1)	<0.017 (1)
Indeno(1,2,3-cd)pyrene	mg/kg	<0.023 (1)	0.033 (1)	0.067 (1)
2-Methylnaphthalene	mg/kg	<0.012 (1)	<0.010 (1)	<0.017 (1)
Naphthalene	mg/kg	<0.012 (1)	<0.010 (1)	<0.017 (1)
Phenanthrene	mg/kg	0.030 (2)	0.037 (2)	0.041 (2)
Pyrene	mg/kg	0.035 (1)	0.045 (1)	0.098 (1)
High Molecular Weight PAH`s	mg/kg	0.14	0.3	0.61
Low Molecular Weight PAH`s	mg/kg	<0.58	<0.51	<0.84
Total PAH	mg/kg	<0.58	<0.51	<0.84

RDL = Reportable Detection Limit
(1) Detection limits raised due to high moisture content, sample contains => 50% moisture.
(2) Qualifying ion outside of acceptance criteria
Results are tentatively identified and potentially biased high
In addition, detection limits raised due to high moisture content, sample contains => 50% moisture.

August 15, 2022		***SWMP06***	***SWMP04***	***SWMP03***
Acenaphthene	*mg/kg*	***<0.050***	***<0.050***	***<0.164***
Acenaphthylene	*mg/kg*	***<0.050***	***<0.050***	***<0.164***
Acridine		***<0.050***	***<0.050***	***<0.164***
Anthracene	*mg/kg*	***<0.050***	***<0.050***	***<0.164***
Benzo(a)anthracene	*mg/kg*	***<0.050***	***<0.050***	***0.168***
Benzo(a)pyrene	*mg/kg*	***<0.050***	***<0.050***	***0.268***
Benzo(b+j)fluoranthene		***<0.050***	***<0.050***	***0.575***
Benzo(b+j+k)fluoranthene		***<0.075***	***<0.075***	***0.575***
Benzo(g,h,i)perylene	*mg/kg*	***<0.050***	***<0.050***	***0.568***
Benzo(k)fluoranthene	*mg/kg*	***<0.050***	***<0.050***	***<0.164***
Chrysene	*mg/kg*	***<0.050***	***<0.050***	***0.187***
Dibenz(a,h)anthracene	*mg/kg*	***<0.050***	***<0.050***	***<0.164***
Fluoranthene	*mg/kg*	***<0.050***	***<0.050***	***0.48***
Fluorene	*mg/kg*	***<0.050***	***<0.050***	***<0.164***
Indeno(1,2,3-cd)pyrene	*mg/kg*	***<0.050***	***<0.050***	***0.537***
methylnaphthalene, 1+2-		***<0.075***	***<0.075***	***<0.232***
methylnaphthalene, 1-		***<0.050***	***<0.050***	***<0.164***
methylnaphthalene, 2-	*mg/kg*	***<0.050***	***<0.050***	***<0.164***
naphthalene	*mg/kg*	***<0.050***	***<0.050***	***<0.164***
phenanthrene	*mg/kg*	***<0.050***	***<0.050***	***0.196***
pyrene	*mg/kg*	***<0.050***	***<0.050***	***0.434***
quinoline		***<0.050***	***<0.050***	***<0.164***
B(a)P total potency equivalents		***<0.065***	***<0.065***	***0.494***
PAHs, total (BC Sched 3.4)	*mg/kg*	***<0.20***	***<0.20***	*1.73*
PAHs, total (EPA 16)	*mg/kg*	***<0.20***	***<0.20***	*3.41*
Surrogate Recovery (%)				
acridine-d9	*%*	*83.5*	*88.9*	*86.5*
chrysene-d12	*%*	*89*	*89.5*	*88.9*
naphthalene-d8	*%*	*78.3*	*81.5*	*80.1*
phenanthrene-d10	*%*	*79.8*	*83.4*	*82.6*

DLHM *Detection Limit Adjusted: Sample has high moisture content.*

HTD *Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*

Table 6.2 BC Sediment Quality Criteria (mg/kg)

Sediment Threshold - Max. Approved (BCMOECCS) based on 1% carbon	
Acenaphthene	0.15 (No Effect)
Acridine	1 (No Effect)
Anthracene	0.6 (No Effect)
Benzo(a)anthracene	0.2 (No Effect)
Benzo(a)pyrene	0.06 (No Effect)
Fluoranthene	2 (No Effect)
Fluorene	0.2 (No Effect)
naphthalene	0.01 (No Effect)
phenanthrene	0.04 (No Effect)

7.0 Recommendations

The increased Secchi depth data collection should be continued.

Continue performing a check on field data by repeating the field data collection as the probes are brought back up to the surface. This is a particularly useful check on slow responding probes as they age or foul. The additional data collection by BCLSS volunteers proved to be useful in the interpretation of the 2022 data and if possible, should be repeated.

Future monitoring of metals in Enos Lake (every 5 years) should include dissolved organic carbon (once per 5 week data set at each depth) and dissolved copper to allow a more thorough assessment and use of the biotic ligand model, as per the BC water quality guidelines.

As noted by Nordin (2017), a water budget for Enos Lake is needed, as it would be useful over the longer term in the support of watershed management planning. PGL (2016) reported that 12 ha of the watershed area of 235 ha had been developed. Further updates on the area's development within the watershed are needed, including data on impervious surfaces. It may also be time to begin basic periodic sampling of the main inflows into Enos Lake to assess turbidity and total suspended solids, particularly following prolonged dry periods and during storm events. Simply limiting turbidity and total suspended solids in surface inputs to the lake is an important fundamental step in protecting Enos Lake water quality.

8.0 Acknowledgements

This document has been prepared as a contract for the BC Conservation Foundation. The conclusions, opinions and any other information in this report represent the author's best professional judgement based on the information available at the time of its completion.

9.0 References

PGL Environmental Consultants. 2016. *Enos Lake Protection and Monitoring Program. Prepared for FW Enterprises Ltd. c/o Seacliff Properties.* PGL file 4675-01.01 30 p + figures and appendix.

British Columbia Ministry of Environment and Climate Change Strategy. 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C

Deniseger, J., 2021. *Enos Lake Protection and Monitoring Program: Review of 2018 Water Quality Data.* 16 p.

Deniseger, J., 2020. *Enos Lake Protection and Monitoring Program: Review of 2018 Water Quality Data.* 14 p.

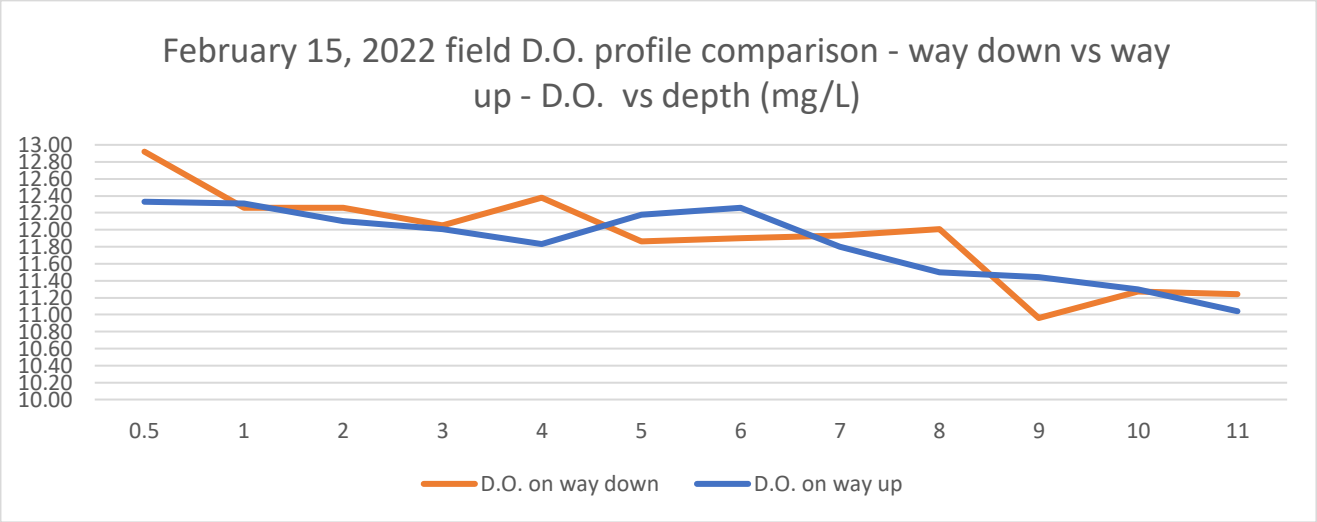
Deniseger, J., 2019. *Enos Lake Protection and Monitoring Program: Review of 2018 Water Quality Data.* 13 p.

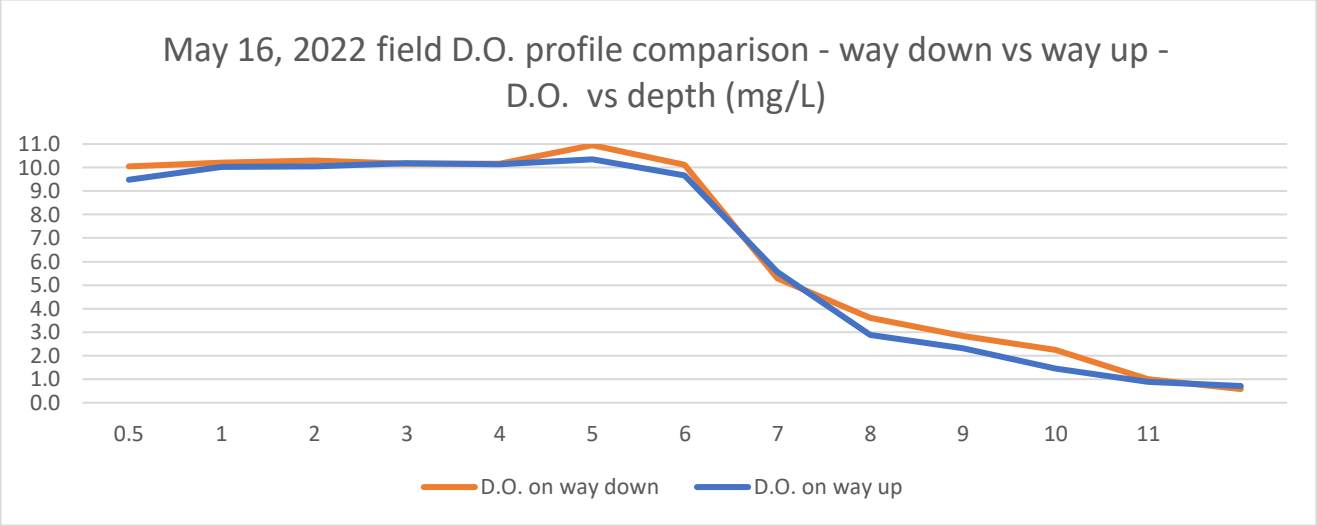
Deniseger, J., 2018. *Enos Lake Protection and Monitoring Program: Review of 2018 Water Quality Data.* 10 p.

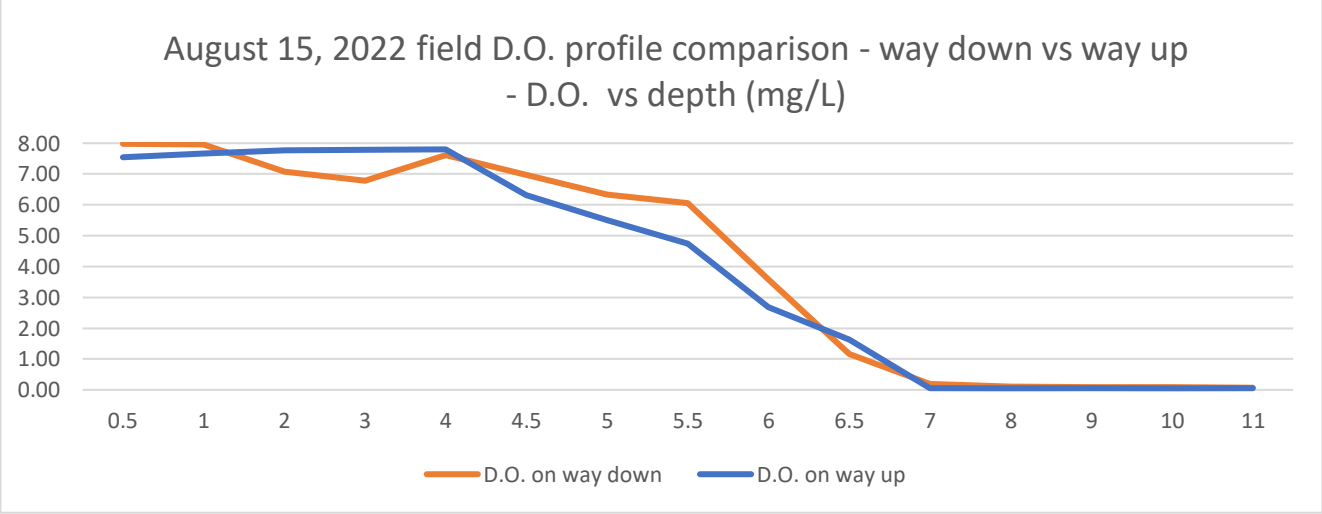
Nordin, R., 2017. *Enos Lake Protection and Monitoring Program: Review of 2017 Water Quality Data*. 23 p.

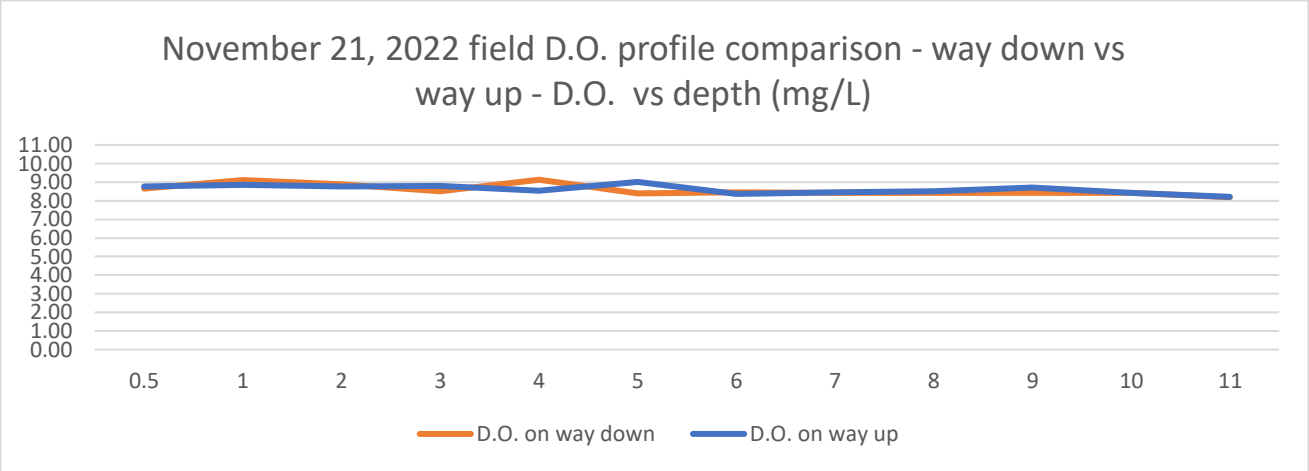
Appendix 1

a) Dissolved Oxygen field profile data check

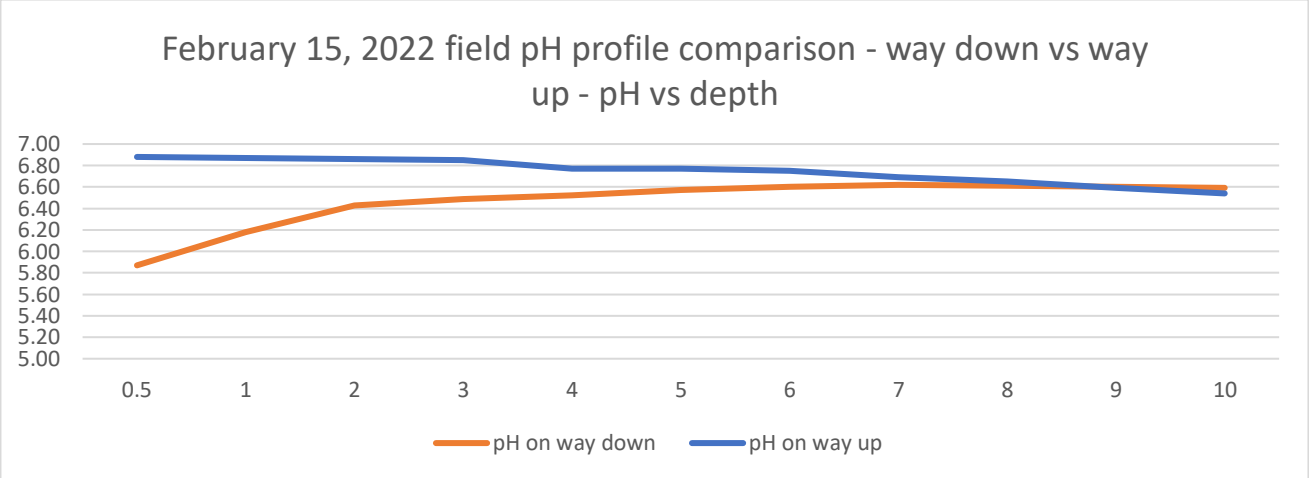


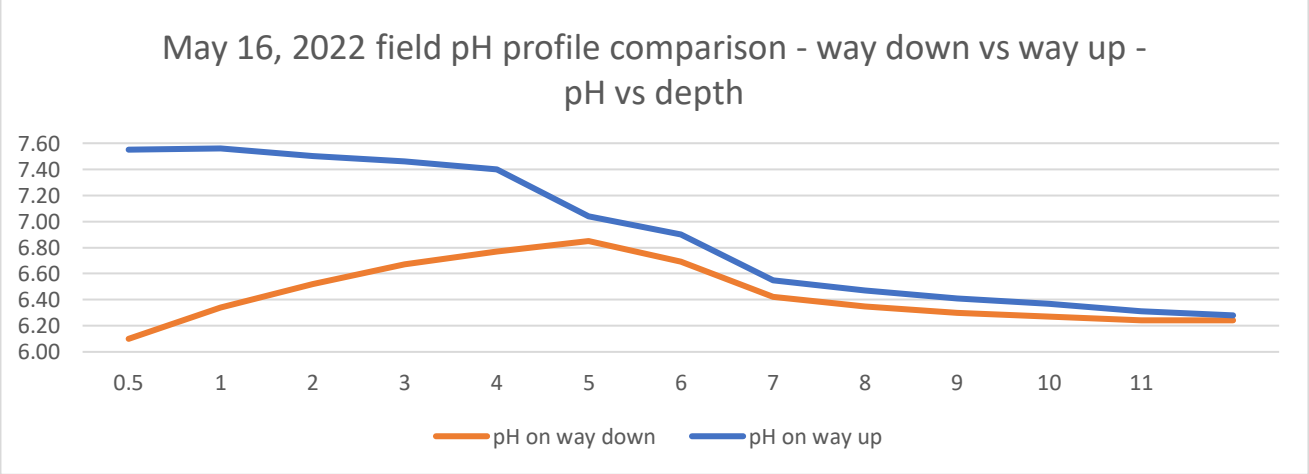


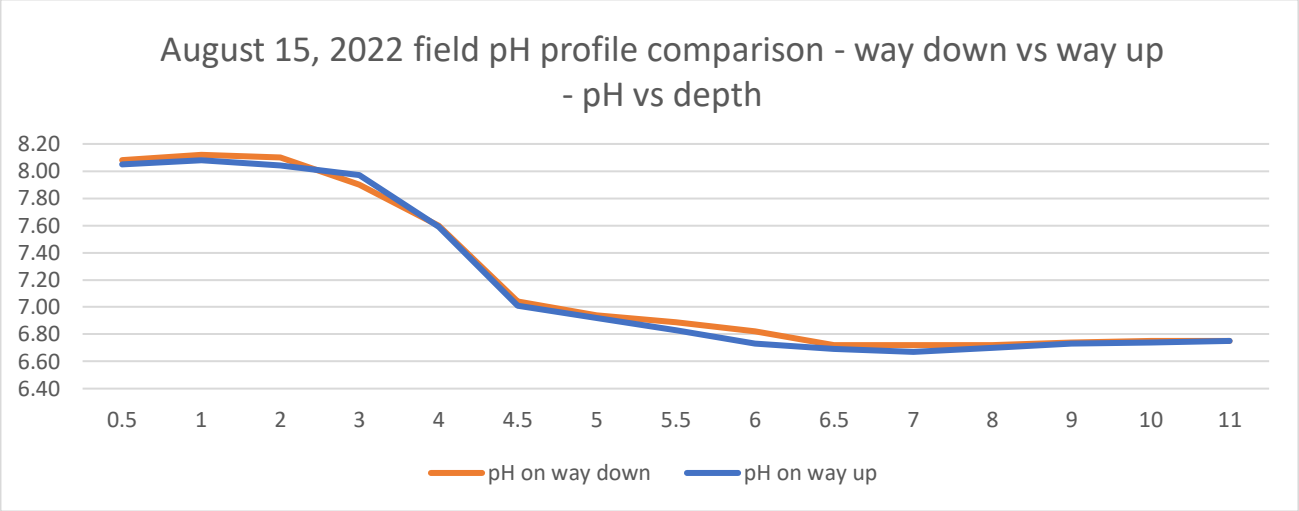


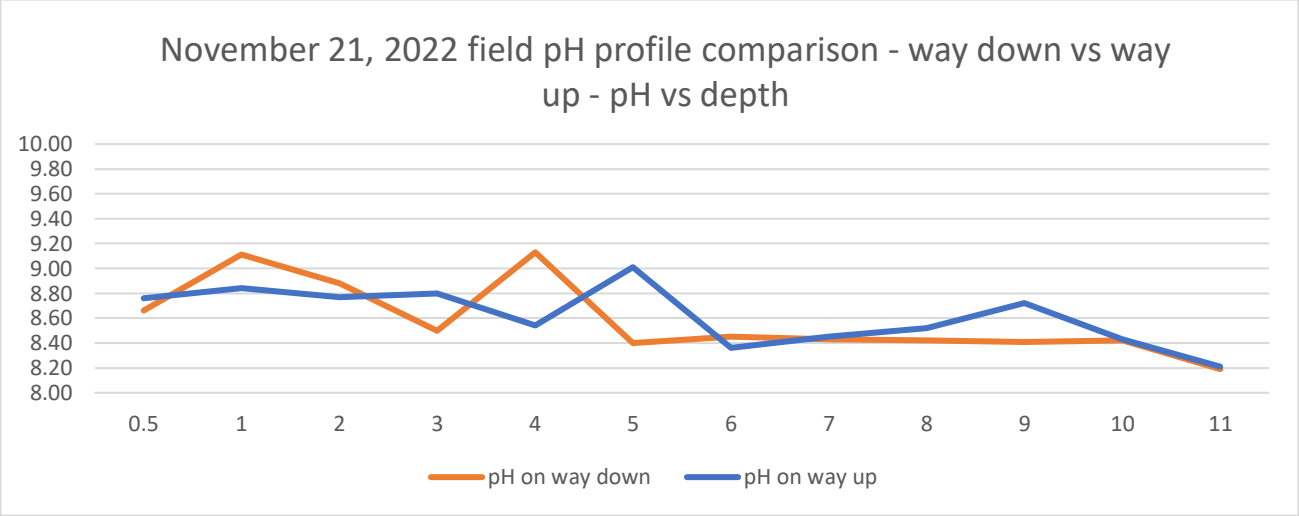


Appendix 1 b) pH field profile data check





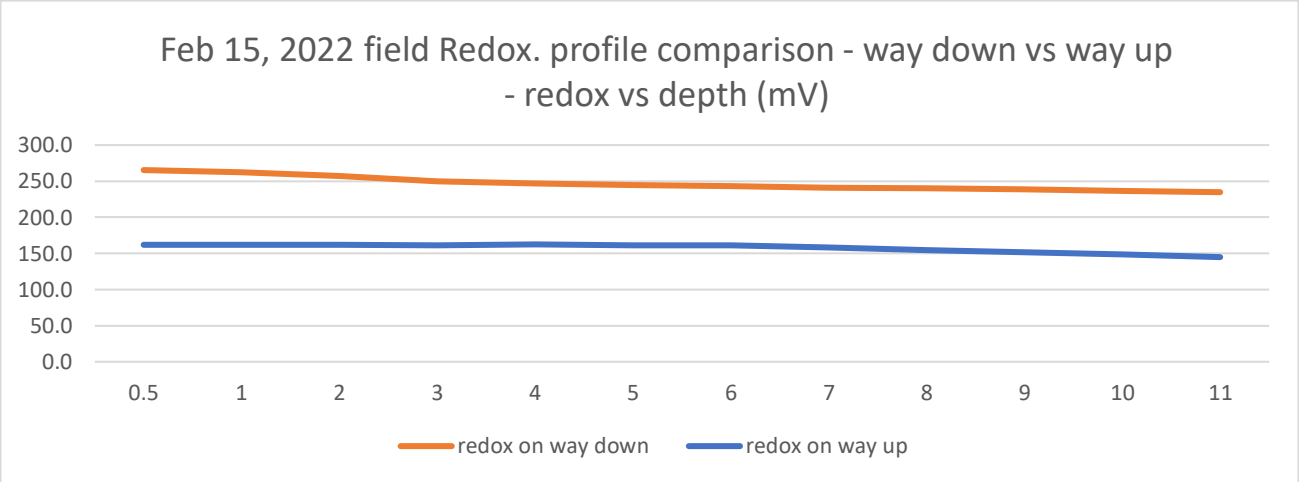

August 15, 2022 field pH profile comparison - way down vs way up - pH vs depth
8.20
8.00
7.80
7.60
7.40
7.20
7.00
6.80
6.60
6.40
0.5
1
2
3
4
4.5
5
5.5
6
6.5
7
8
9
10
11
pH on way down
pH on way up

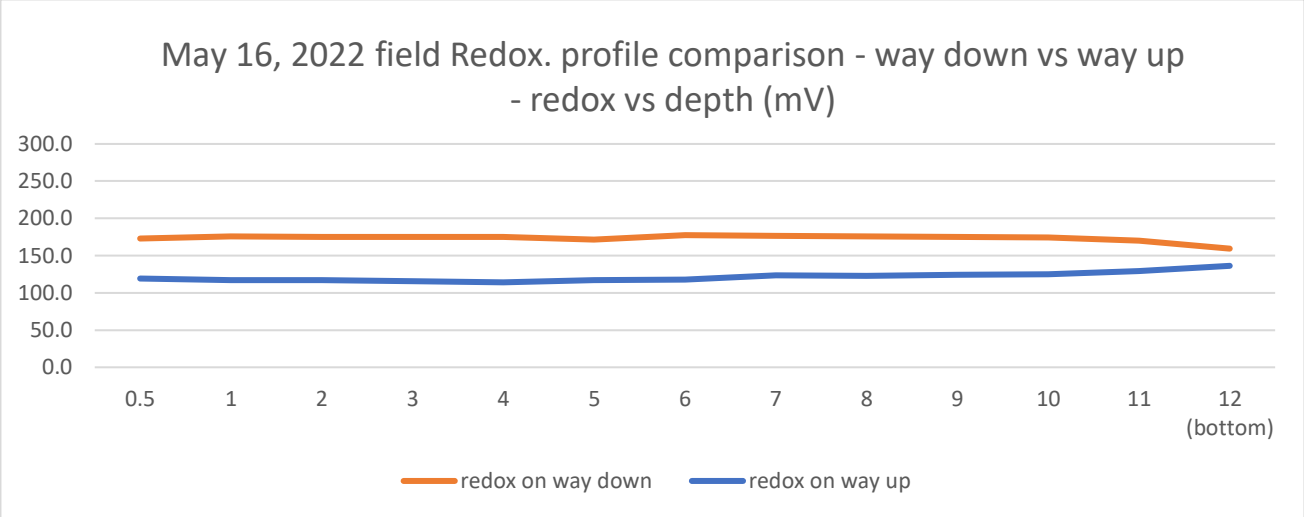

November 21, 2022 field pH profile comparison - way down vs way up - pH vs depth
10.00
9.80
9.60
9.40
9.20
9.00
8.80
8.60
8.40
8.20
8.00
0.5
1
2
3
4
5
6
7
8
9
10
11
pH on way down
pH on way up

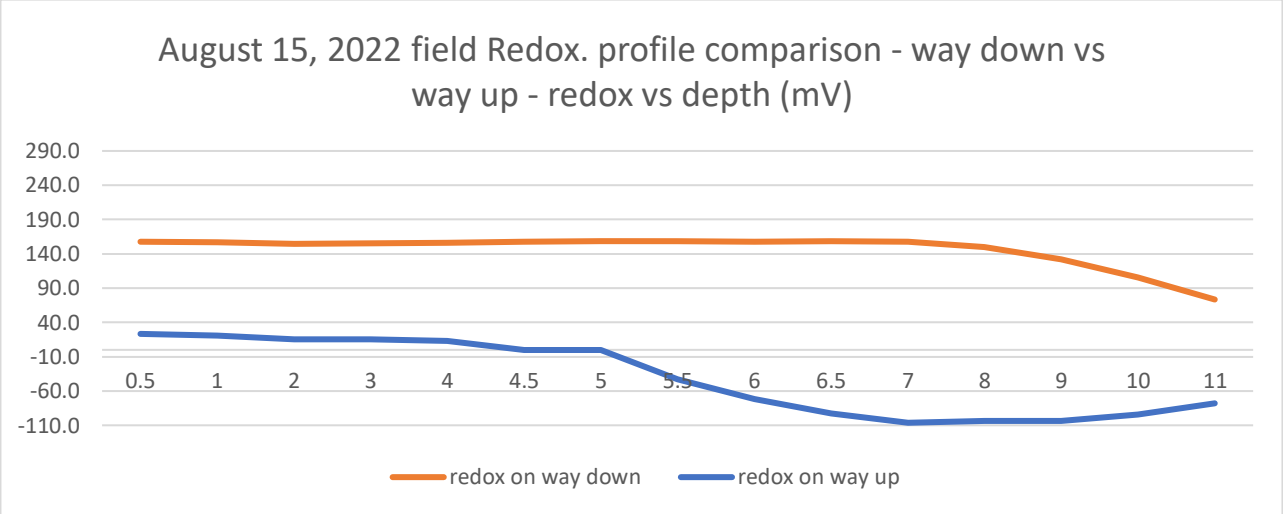
Appendix 1 c) Redox field profile data check

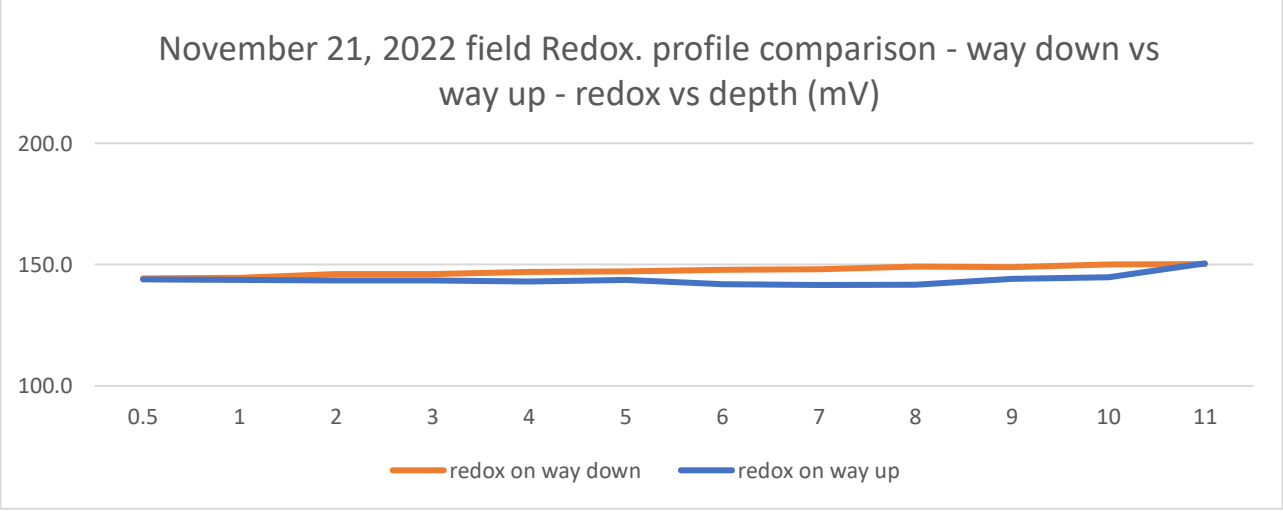
Enos Lake redox potential profiles for 2022 (limited to data collected on the “way down”)

Profile - Site SWMP-03				
	2/15/2022	**5/16/2022**	**8/15/2022**	**11/21/2022**
Depth (m)	Redox (mV)	Redox (mV)	Redox (mV)	Redox (mV)
0.5	265.4	173.2	157.9	144.3
1	262.6	175.7	156.5	144.5
2	257.2	175.4	154.9	146.0
3	249.5	174.9	155.7	146.2
4	246.8	174.9	156.4	147.0
4.5			157.8	
5	244.9	171.6	158.5	147.2
5.5			158.3	
6	243.1	177.5	157.9	147.8
6.5			158.1	
7	241.1.	176.9	157.8	148.1
8	239.9	175.7	150.1	149.1
9	238.9	175.0	131.9	149.0
10	236.2	174.1	105.5	150.1
11	234.8	170.4	73.4	150.2
12		159.4		




May 16, 2022 field Redox. profile comparison - way down vs way up - redox vs depth (mV)
300.0
250.0
200.0
150.0
100.0
50.0
0.0
0.5
1
2
3
4
5
6
7
8
9
10
11
12
(bottom)
redox on way down
redox on way up


August 15, 2022 field Redox. profile comparison - way down vs way up - redox vs depth (mV)
290.0
240.0
190.0
140.0
90.0
40.0
-10.0
-60.0
-110.0
0.5
1
2
3
4
4.5
5
5.5
6
6.5
7
8
9
10
11
redox on way down
redox on way up


November 21, 2022 field Redox. profile comparison - way down vs way up - redox vs depth (mV)
200.0
150.0
100.0
0.5
1
2
3
4
5
6
7
8
9
10
11
redox on way down
redox on way up

Appendix 3 – Additional figures

Total Phosphorous

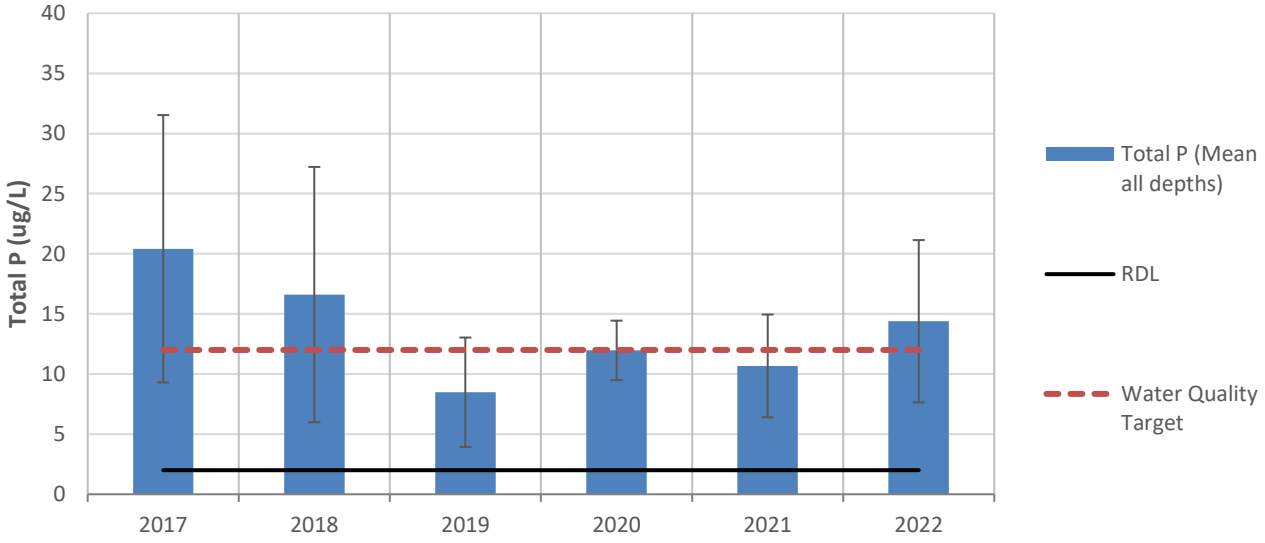


Figure A3.1: Mean Total Phosphorous across all depths, 2017-2022.

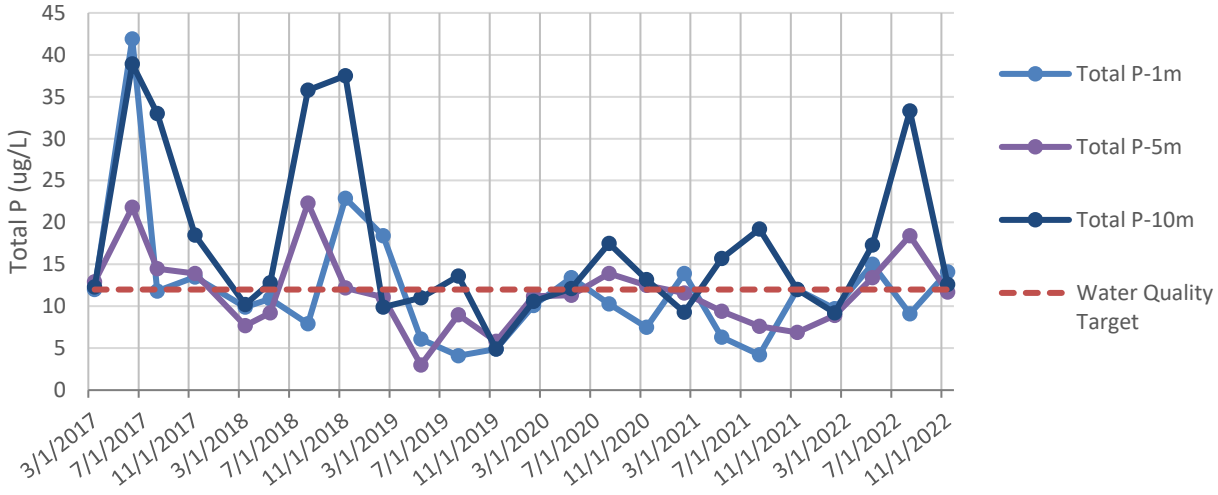


Figure A3.2: Total Phosphorous over time at 1, 5, and 10 m depths, 2017-2022.

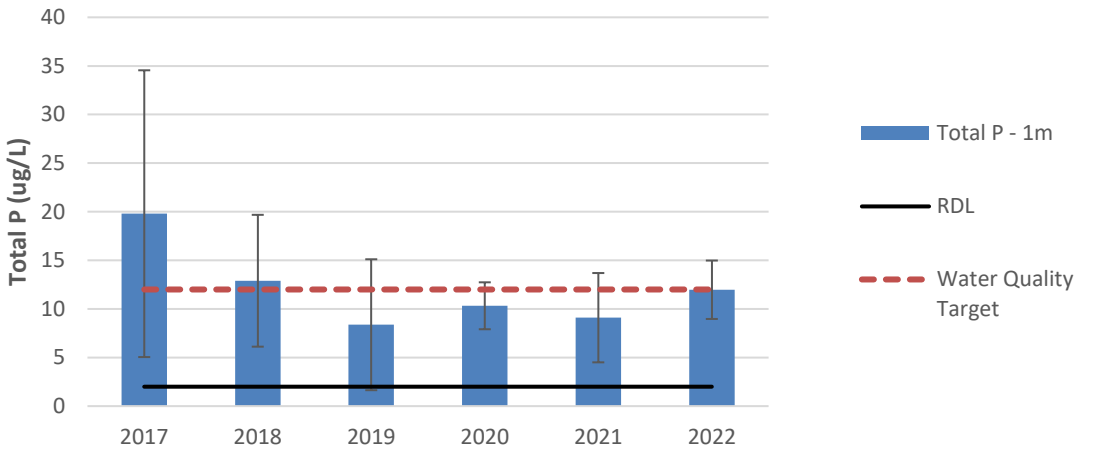


Figure A3.3: Mean Total Phosphorous at 1 m depth only, 2017-2022.

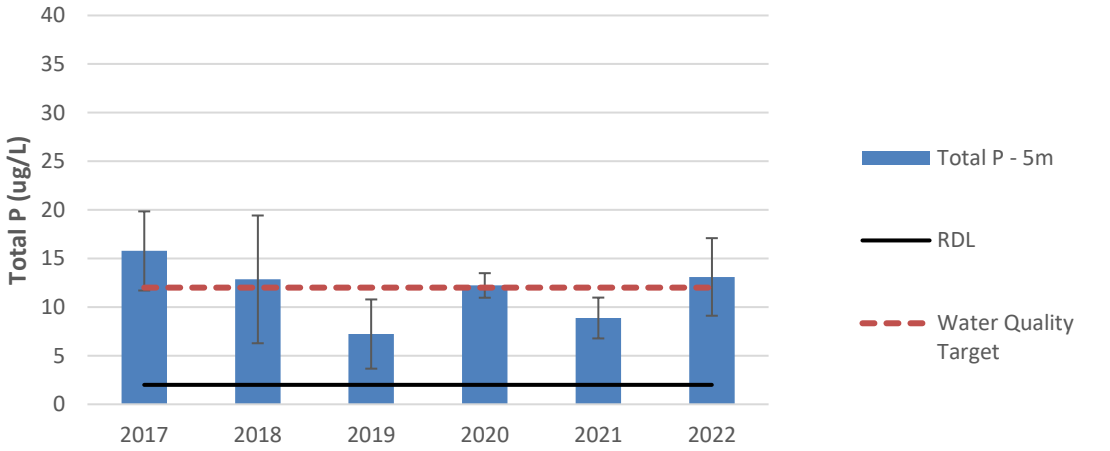


Figure A3.4: Mean Total Phosphorous at 5 m depth only, 2017-2022.

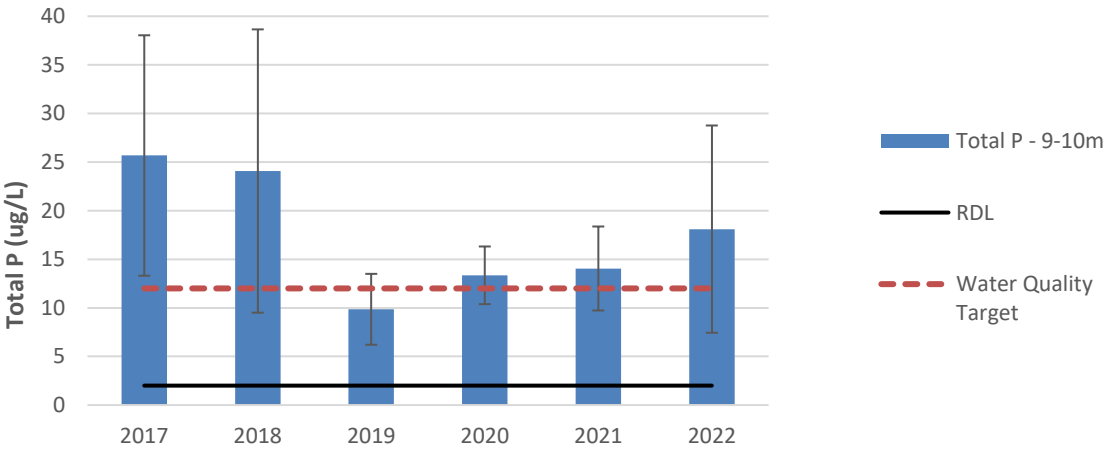


Figure A3.5: Mean Total Phosphorous at 9-10 m depths only, 2017-2022.

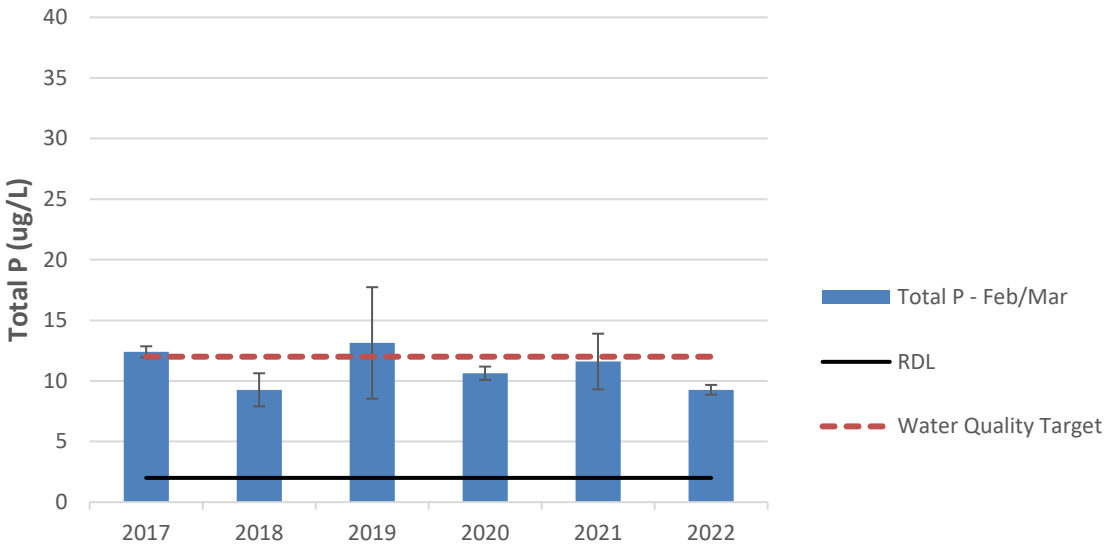


Figure A3.6: Mean Total Phosphorous in first quarter, 2017-2022.

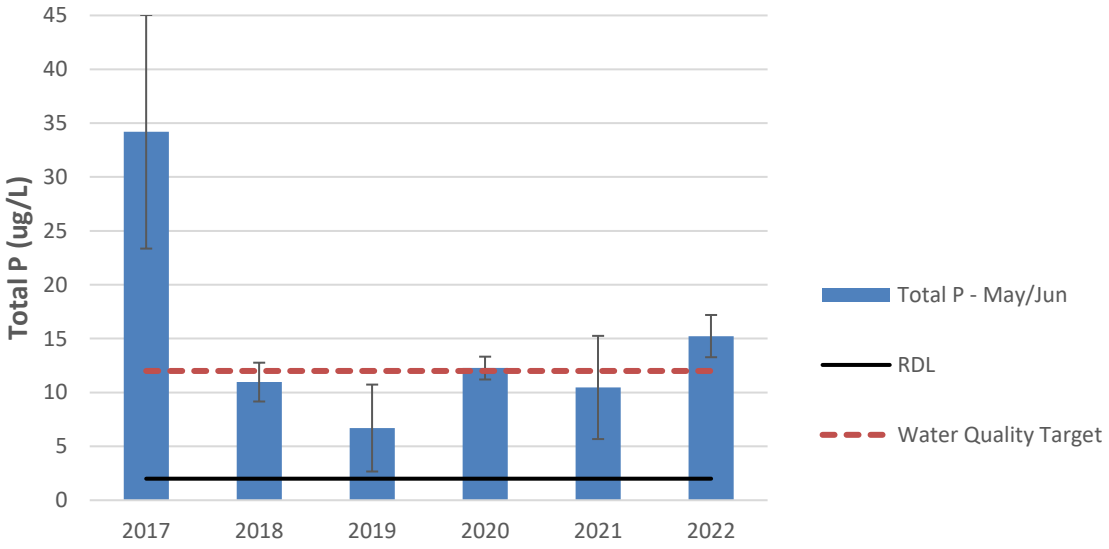


Figure A3.7: Mean Total Phosphorous in second quarter, 2017-2022.

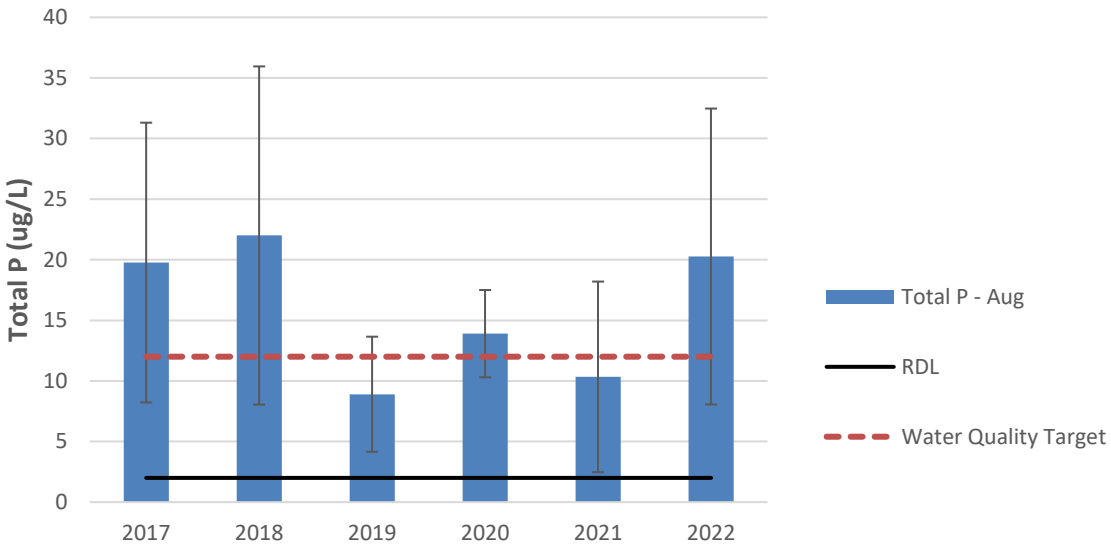


Figure A3.8: Mean Total Phosphorous in third quarter, 2017-2022.

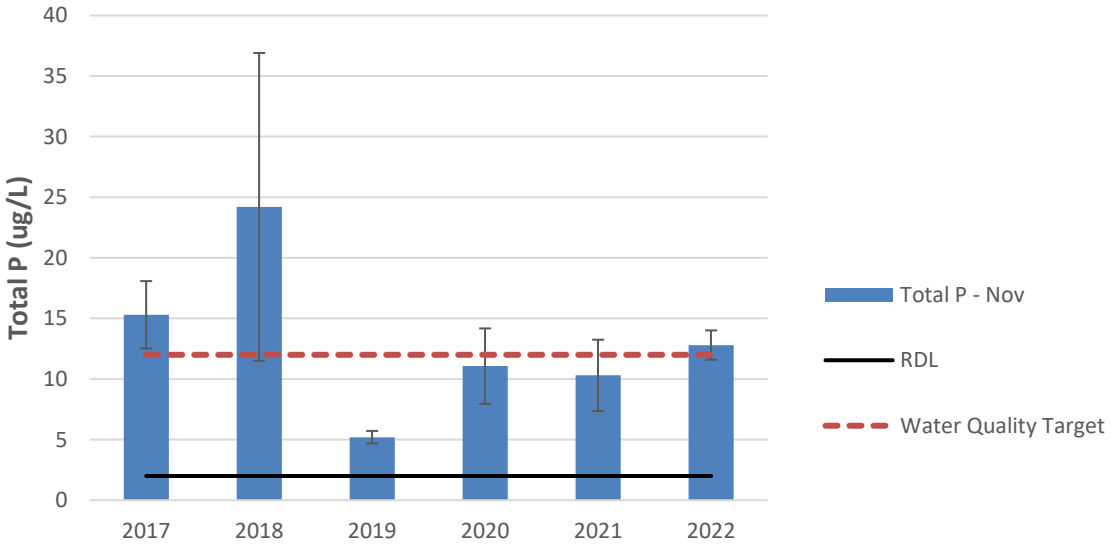
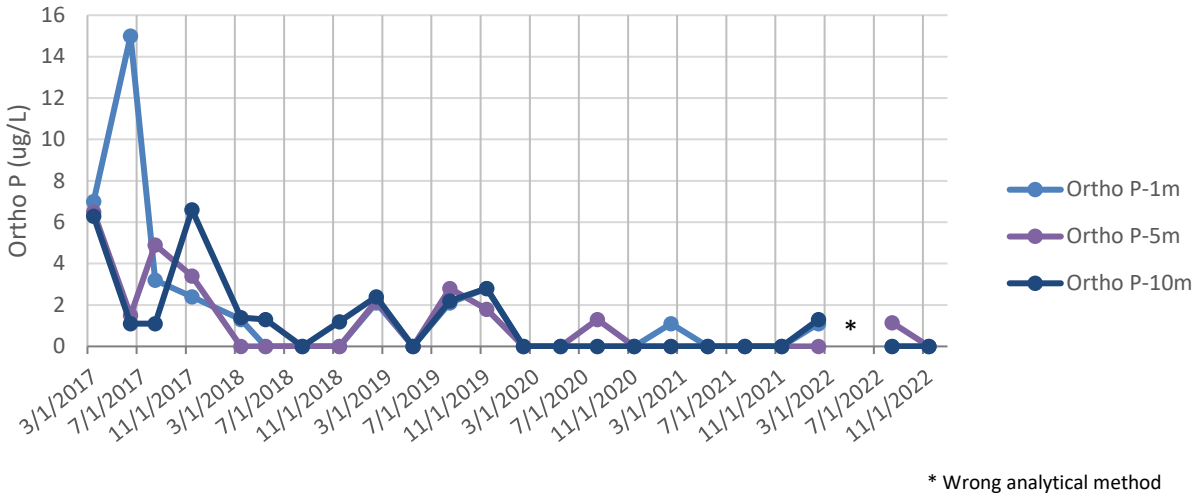


Figure A3.9: Mean Total Phosphorous in fourth quarter, 2017-2022.

Dissolved Orthophosphate



* Wrong analytical method

Figure A3.10: Orthophosphate over time at 1, 5, and 10 m depths, 2017-2022.

Chlorophyll-a

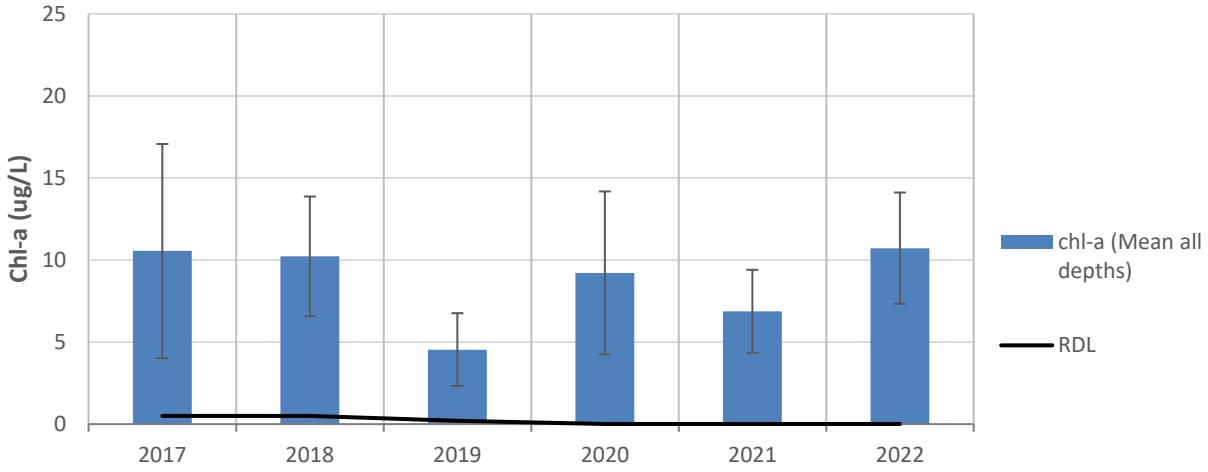
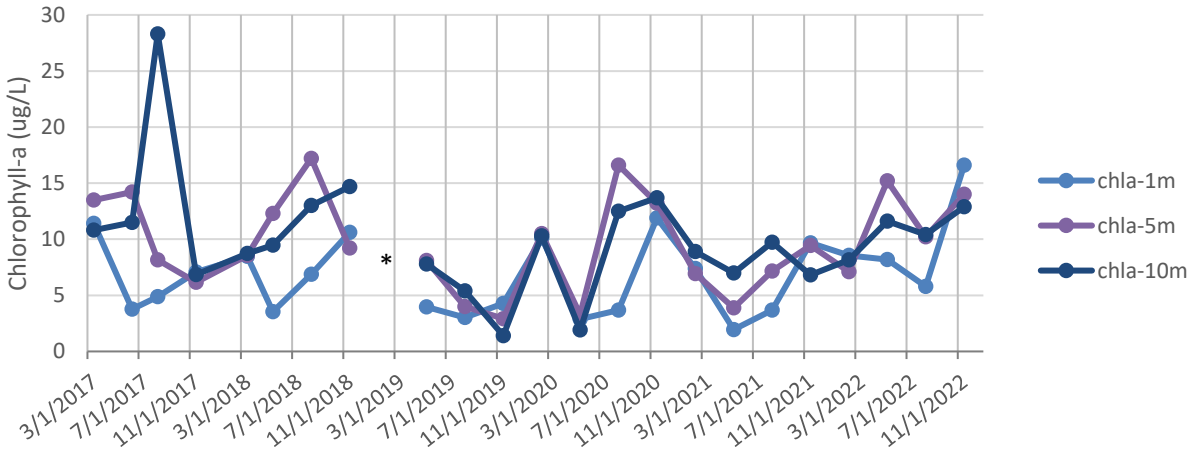


Figure A3.11: Mean Chlorophyll-a across all depths, 2017-2022.



* Sample destroyed

Figure A3.12: Chlorophyll-a over time at 1, 5, and 10 m depths, 2017-2022.

Appendix 4 – Field data

1st Quarter - 1st Site Visit

Date:	Feb 01 2022	
Time:	10:20	
Crew :	TR, Chris	
Objectives:	Sampling for metals, hardness, TSS, turbidity (5x in 30 days)	
Weather:	light cloud, overcast	
Air Temp:	5.8°C	
Surface Temp:	4.4°C	
Secchi:	1.25m 1.35m	
Staff Gauge:	0.935m	@ 10:20

Site SWMP-03			
Depth (m)	Time	Temp. (°C)	pH
1	10:40	4.1	6.48
1 (rep)	10:43	4.1	6.48
5	10:48	4.1	6.55
10	10:54	4.1	6.63

WQ Samples collected 10:40am - 11:00am
Turbidity (TSS) - 5 m
Total metals/Hardness (plastic) - 1, 5, 10m
Total Hg (glass) - 1, 5, 10m

	Hardness	TSS (mg/L)	Turbidity (NTU)
1m	42.2	-	-
1m rep	42.8	-	-
5m	42.0	<3.0	1.50
10m	42.0	-	-

1st Quarter - 2nd Site Visit

Date:	Feb 08 2022	
Time:	9:50	
Crew :	TR, AA	
Objectives:	Sampling for metals, hardness, TSS, turbidity (5x in 30 days)	
Weather:	overcast, light breeze, hint of rain	
Air Temp:	6.4°C	
Surface Temp:	5.0°C	
Secchi:	2.27m 2.30m	
Staff Gauge:	0.915m	@ 10:00

Site SWMP-03			
Depth (m)	Time	Temp. (°C)	pH
1	10:00	4.6	6.62
5	10:05	4.2	6.66
5 (rep)	10:08	4.2	6.66
10	10:15	4.1	6.66

WQ Samples collected 10:00am - 10:30am
Turbidity (TSS) - 5 m
Total metals/Hardness (plastic) - 1, 5, 10m
Total Hg (glass) - 1, 5, 10m

	Hardness	TSS (mg/L)	Turbidity (NTU)
1m	41.1	-	-
5m	41.5	<3.0	1.40
5m rep	41.7	-	-
10m	41.7	-	-

1st Quarter Sampling

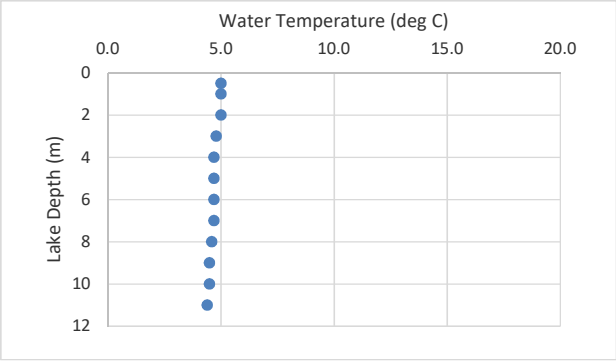
Date:	Feb 15 2022
Time:	10:15
Crew :	TR, DS
Objectives:	Sampling for metals, hardness, TSS, turbidity (5x in 30 days); water profile
Weather:	overcast, light breeze (ripples on surface); sun appeared at 12:00pm
Air Temp:	~7°C
Surface Temp:	~5°C
Secchi:	1.82 1.75 **1.785 m**
Staff Gauge:	**0.92m** @ 10:40

Profile - Site SW (Profile for the way down)

Depth (m)	Temp. (°C)	D.O. (mg/L)	D.O. (%)	Sp.Con. (µS/cm)	pH	Redox (mV)
0.5	5.0	12.92	101.7	122.8	5.67	265.4
1	5.0	12.26	96.0	122.8	5.87	262.6
2	5.0	12.26	95.9	122.7	6.18	257.2
3	4.8	12.05	94.0	122.8	6.43	249.5
4	4.7	12.38	96.3	122.7	6.49	246.8
5	4.7	11.86	92.2	122.9	6.52	244.9
6	4.7	11.90	92.4	122.9	6.57	243.1
7	4.7	11.93	92.7	122.8	6.60	241.1
8	4.6	12.01	93.0	122.9	6.62	239.9
9	4.5	10.96	84.7	123.4	6.61	238.9
10	4.5	11.27	86.9	123.8	6.6	236.2
11	4.4	11.24	86.7	123.9	6.59	234.8

Profile - Site SW (Profile for the way up)

Depth (m)	Temp. (°C)	D.O. (mg/L)	D.O. (%)	Sp.Con. (µS/cm)	pH	Redox (mV)
11	4.5	11.04	85.3	124.5	6.51	144.9
10	4.5	11.30	87.3	123.7	6.54	148.8
9	4.5	11.44	88.4	123.2	6.59	151.4
8	4.5	11.50	89.0	123.3	6.65	154.7
7	4.6	11.80	91.7	122.8	6.69	158.3
6	4.7	12.26	95.3	122.8	6.75	160.9
5	4.7	12.18	94.8	122.8	6.77	161.1
4	4.9	11.83	92.4	122.9	6.77	162.5
3	5.0	12.01	94.2	122.8	6.85	161.0
2	5.0	12.10	94.8	122.8	6.86	161.6
1	5.0	12.31	96.5	122.8	6.87	162.0
0.5	5.1	12.33	96.9	122.8	6.88	162.3



Felt bottom at 11.5 m.

1st Quarter - 4th Site Visit

Date:	Feb 22 2022
Time:	9:45
Crew :	AA, TN
Objectives:	Sampling for metals, hardness, TSS, turbidity (5x in 30 days)
Weather:	sunny, cold
Air Temp:	1°C
Surface Temp:	5.4°C
Secchi:	2.117m 2.139m
Staff Gauge:	0.91m @ 10:05

Site SWMP-03			
Depth (m)	Time	Temp. (°C)	pH*
1	10:47	5.3	
1 (rep)	10:49	5.3	
5	10:50	5.2	
10	10:54	5.2	

WQ Samples collected 10:45am - 11:10pm Turbidity (TSS) - 5 m
Total metals/Hardness (plastic) - 1, 5, 10m
Total Hg (glass) - 1, 5, 10m

*pH probe not calibrated

	Hardness	TSS (mg/L)	Turbidity (NTU)
1m	43.9	-	-
1m rep	44.8	-	-
5m	44.1	<3.0	1.43
10m	44.0	-	-

1st Quarter - 5th Site Visit

Date:	Feb 29 2022
Time:	9:45
Crew :	TR, PL
Objectives:	Sampling for metals, hardness, TSS, turbidity (5x in 30 days)
Weather:	overcast, breezy; it has rained the past few days and more to come
Air Temp:	8.0°C
Surface Temp:	5.3°C
Secchi:	1.78m
Staff Gauge:	0.945m @ 10:15

Site SWMP-03			
Depth (m)	Time	Temp. (°C)	pH
1	10:30	5.0	6.09
5	10:35	5.0	6.67
5 (rep)	10:37	5.0	6.67
10	10:41	5.0	6.76

WQ Samples collected 10:30am - 11:00pm
Turbidity (TSS) - 5 m
Total metals/Hardness (plastic) - 1, 5, 10m
Total Hg (glass) - 1, 5, 10m

	Hardness	TSS (mg/L)	Turbidity (NTU)
1m	43.8	-	-
5m	44.1	<3.0	1.38
5m rep	43.5	-	-
10m	43.3	-	-

2nd Quarter Sampling

Date:	May 16 2022	
Time:	10:45	
Crew :	TR, KS	
Objectives:	Sampling for standard water profile & productivity	
Weather:	Sunny, overcast, light breeze. Rained heavily yesterday	
Air Temp:	~16°C	
Surface Temp:	~13°C	
Secchi:	2.8 2.74	**2.77 m**
Staff Gauge:	**0.92m**	@ 11:45

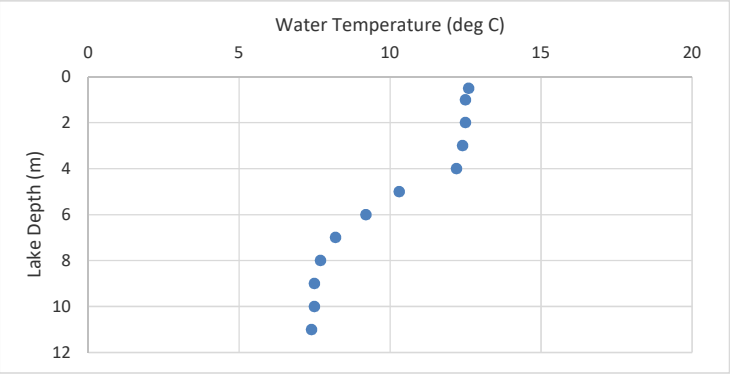
Notes:
- pH, DO, conductivity and redox probes all calibrated this morning.
- pH results look more suitable on way up than way down.
- Redox results confusing, sent for consult
- New DO membrane cap installed this morning.
- Results are similar to May 2021

Profile - Site SW (Profile for the way down)

Depth (m)	Temp. (°C)	D.O. (mg/L)	D.O. (%)	Sp.Con. (µS/cm)	pH	Redox (mV)
0.5	12.6	10.0	94.2	127.0	6.10	173.2
1	12.5	10.2	95.6	127.1	6.34	175.7
2	12.5	10.3	96.5	126.8	6.52	175.4
3	12.4	10.2	95.1	126.9	6.67	174.9
4	12.2	10.2	94.8	127.0	6.77	174.9
5	10.3	11.0	97.2	125.8	6.85	171.6
6	9.2	10.1	88.3	126.0	6.69	177.5
7	8.2	5.3	45.1	128.8	6.42	176.9
8	7.7	**3.6**	**30.2**	130.2	6.35	175.7
9	7.5	**2.8**	**23.9**	131.0	6.30	175.0
10	7.5	**2.2**	**18.7**	131.4	6.27	174.1
11	7.4	**1.0**	**8.3**	133.6	6.24	170.4
12 (bottom)	7.3	**0.6**	**4.8**	135	6.24	159.4

Profile - Site SW (Profile for the way up)

Depth (m)	Temp. (°C)	D.O. (mg/L)	D.O. (%)	Sp.Con. (µS/cm)	pH	Redox (mV)
12	7.4	**0.7**	**5.9**	135.1	6.28	136.3
11	7.4	**0.9**	**7.3**	133.0	6.31	129.4
10	7.4	**1.5**	**12.1**	132.0	6.37	125.2
9	7.5	**2.3**	**19.1**	131.3	6.41	124.5
8	7.6	**2.9**	**24.1**	130.9	6.47	123.1
7	8.3	5.6	46.9	128.5	6.55	123.2
6	9.1	9.7	84.0	126.3	6.90	117.8
5	10.3	10.4	92.4	125.9	7.04	117.3
4	12.1	10.1	94.1	127.4	7.40	114.1
3	12.4	10.2	95.6	127.4	7.46	115.3
2	12.5	10.0	94.5	127.4	7.50	117.4
1	12.6	10.0	94.6	127.5	7.56	117.2
0.5	12.7	9.5	90.0	127.4	7.55	118.9



Felt bottom at 12 m. Likely disturbed plume of sediment when probe hit bottom.

3rd Quarter - 1st Site Visit

Date: August 2, 2022
Time: 10:15 - 12:45
Crew : AA, HT
Objectives: Sampling for metals, hardness, TSS, turbidity & E. coli (5x in 30 days)
Weather: Sunny, light breeze
Air Temp: 19°C
Surface Temp: 25.6°C
Secchi: 2.91 m
Staff Gauge: 0.81 m @ 11:30

Site SWMP-03

Depth (m)	Temp. (°C)	DO (%)	DO (mg/L)	pH*
1	25.6	88.5	7.26	8.07
5	14.7	75.5	7.61	7.13
10	7.8	3.6	0.42	6.88

WQ Samples collected 10:37am - 11:15am
Turb & TSS - 5 m; Total met./hardness - 1, 5, 10 m (rep 5m) @ SWMP-03 E. coli - 1m @ SWMP 03, 04, 06

COC 20-982083

SWMP-04	E. coli	Total coliforms
1m	<1	260

SWMP-06	E. coli	Total coliforms
1m	1	2420

SWMP-03	Total Hardness	TSS (mg/L)	Turbidity (NTU)	E. coli	Total coliforms
1m	45.8	-	-	<1	261
5m	43.0	<3.0	1.37		
5m rep	44.6				
10m	46.5				

3rd Quarter - 2nd Site Visit

Date: Aug 09 2022
Time: 10:00-12:30
Crew : TR, AB
Objectives: Sampling for metals, hardness, TSS, turbidity & E. coli (5x in 30 days)
Weather: Sunny, light cloud in south
Air Temp: 23.1°C
Surface Temp: 23.3°C
Secchi: 3.20 m

Staff Gauge: 0.765 m @ 10:00

Site SWMP-03

Depth (m)	Temp. (°C)	DO (%)	DO (mg/L)	pH
1	23.3	94.5	8.12	7.86
5	15.8	78.8	7.76	6.95
10	7.8	3.5	0.41	6.71

WQ Samples collected 10:15am - 11:00am
Turbidity (TSS) - 5 m Total metals/Hardness - 1, 5, 10 m (replic E. coli - 1m @ SWMP 03, 04, 06

COC 20-992050

SWMP-04	E. coli
1m	1

SWMP-06	E. coli
1m	2

SWMP-03	Total Hardness	TSS (mg/L)	Turbidity (NTU)	E. coli
1m	48.3	-	-	1
5m	45.7	3.5	1.39	
10 m	47.7			
10 m rep	46.8			

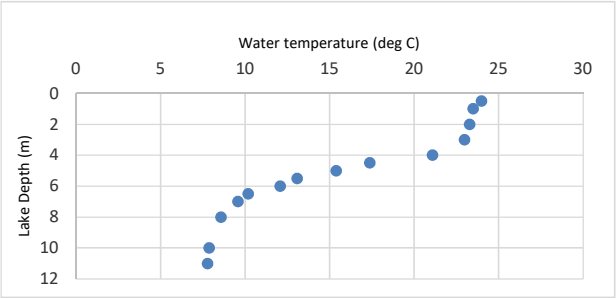
3rd Quarter Sampling

Date:	August 15, 2022
Time:	10:30 - 14:30
Crew :	TR, AB
Objectives:	Sampling for metals, hardness, TSS, turbidity, E. coli (5x in 30 days) & full quarterly profile
Weather:	Sunny, hot
Air Temp:	22.5°C
Surface Temp:	23.4°C
Secchi:	**2.48 m**
Staff Gauge:	**0.718 m @ 11:00**

BRITISH COLUMBIA CONSERVATION FOUNDATION

Profile - Site SWM (Profile for the way down)			**12:00-12:30**			
Depth (m)	Temp. (°C)	D.O. (mg/L)	D.O. (%)	Sp.Con. (µS/cm)	pH	Redox (mV)
0.5	24.0	7.98	95.8	141.0	8.08	157.9
1	23.5	7.96	93.8	141.0	8.12	156.5
2	23.3	7.08	82.7	140.8	8.10	154.9
3	23.0	6.79	78.9	140.9	7.90	155.7
4	21.1	7.61	86.2	137.3	7.60	156.4
4.5	17.4	6.97	73.0	131.7	7.04	157.8
5	15.4	6.33	63.6	130.9	6.94	158.5
5.5	13.1	6.06	57.5	131.5	6.89	158.3
6	12.1	**3.58**	**33.0**	132.7	6.82	157.9
6.5	10.2	**1.16**	**10.5**	132.6	6.72	158.1
7	9.6	**0.20**	**1.8**	134.5	6.72	157.8
8	8.6	**0.10**	**0.8**	144.0	6.72	150.1
9	8.2	**0.08**	**0.7**	151.2	6.74	131.9
10	7.9	**0.08**	**0.6**	155.5	6.75	105.5
11	7.8	**0.07**	**0.5**	156.4	6.75	73.4

Profile - Site SWM (Profile for the way up)			**12:30-13:00**			
Depth (m)	Temp. (°C)	D.O. (mg/L)	D.O. (%)	Sp.Con. (µS/cm)	pH	Redox (mV)
11	7.8	**0.06**	**0.5**	157.4	6.75	-77.6
10	7.9	**0.05**	**0.4**	155.3	6.74	-94.6
9	8.0	**0.06**	**0.5**	152.4	6.73	-103.8
8	8.6	**0.05**	**0.4**	144.6	6.70	-104.0
7	9.4	**0.06**	**0.5**	134.8	6.67	-106.3
6.5	10.5	**1.62**	**14.5**	132.0	6.69	-93.0
6	11.3	**2.69**	**24.8**	131.0	`6.73	-72.1
5.5	13.1	**4.75**	**45.7**	130.3	6.83	-42.6
5	15.0	5.50	54.5	128.2	6.92	≈6.2
4.5	17.3	6.31	65.7	132.1	7.01	≈5.4
4	21.0	7.80	89.9	136.1	7.59	12.8
3	22.9	7.78	90.8	139.5	7.97	15.4
2	23.3	7.77	92.5	140.7	8.04	15.3
1	23.6	7.67	90.3	140.8	8.08	20.8
0.5	23.8	7.55	91.0	141.1	8.05	23.3



Felt bottom around 11.3 m... Likely disturbed big plume of sediment when probe hit bottom, ORP very affected
Person and dogs seen swimming near SWMP 04

3rd Quarter - 4th Site Visit

Date:	August 23, 2022
Time:	10-13:00
Crew :	TR, JD
Objectives:	Sampling for metals, hardness, TSS, turbidity & E. coli (5x in 30 days)
Weather:	Breezy (rippled surface), sunny, hot.
Air Temp:	23 °C
Surface Temp:	24.6 °C
Secchi:	2.32 m
Staff Gauge:	0.700 m @ 10:58

Notes:
- Still visible bloom. Quite windy
- Water from 10m v stinky
- PL out doing secchi

Site SWMP-03

Depth (m)	Temp. (°C)	DO (%)	DO (mg/L)	pH	Sp Con	ORP
1	24.5	94.0	7.79	8.03	138.20	163.8
5	16.0	36.6	3.57	6.69	128.60	169.8
10	7.9	4.4	0.52	6.77	153.20	-33.7

WQ Samples collected 11:45 - 12:40 pm

Turb & TSS - 5 m; Total met./hardness - 1, 5, 10 m (rep 1m) @ SWMP-03

E. coli - 1m @ SWMP 03, 04, 06

COC 20-982086

SWMP-04	E. coli	Total coliforms
1m	9	-

SWMP-06	E. coli	Total coliforms
1m	7	-

SWMP-03	Total Hardness	TSS (mg/L)	Turbidity (NTU)	E. coli	Total coliforms
1m	44.9	-	-	1	-
1m rep	44.6	-	-		
5m	42.6	<3.0	1.44		
10m	44.4				

3rd Quarter - 5th Site Visit

Date:	August 29, 2022
Time:	10-12:30
Crew :	TR, HT
Objectives:	Sampling for metals, hardness, TSS, turbidity & E. coli (5x in 30 days)
Weather:	Sun/cloud, warm, light breeze from south. No rain for several weeks. Cool overnight past few days.
Air Temp:	23 °C
Surface Temp:	23.3 °C
Secchi:	2.37 m
Staff Gauge:	0.635 m @ 10:58 am

Notes:
- Still visible bloom. Water from 10m v stinky

Site SWMP-03

Depth (m)	Temp. (°C)	DO (%)	DO (mg/L)	pH
1	23.2	84.0	7.13	7.98
5	15.7	32.7	3.22	6.74
10	8.1	5.30	0.62	6.70

WQ Samples collected 10:15am - 11:00am

Turb & TSS - 5 m; Total met./hardness - 1, 5, 10 m (rep 5m) @ SWMP-03

E. coli - 1m @ SWMP 03, 04
0.5m @ SWMP-06

COC 20-982085

SWMP-04	E. coli	Total coliforms
1m	8	261

SWMP-06	E. coli	Total coliforms
0.5m	6	236

SWMP-03	Total Hardness	TSS (mg/L)	Turbidity (NTU)	E. coli	Total coliforms
1m	47.5	-	-	1	75
5m	44.3	<3.0	1.4		
5m rep	45.4				
10m	47.4				

4th Quarter Sampling

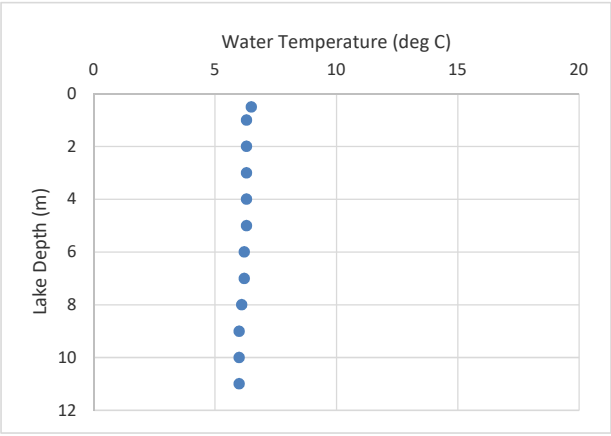
Date:	Nov. 21, 2022
Time:	10:30-13:00
Crew :	TR, EF
Objectives:	Sampling for standard water profile & productivity
Weather:	Light breeze, cloudy/overcast and cool
Air Temp:	Approx. 8 C
Surface Temp:	6.5 °C
Secchi:	**2.16 m**
Staff Gauge:	**0.48 m @ 11:00**

New DO membrane probe this morning
Lake very low for this time of year

BRITISH COLUMBIA CONSERVATION FOUNDATION

Profile - Site SWI (Profile for the way down)			**11:15-11:45**			
Depth (m)	Temp. (°C)	D.O. (mg/L)	D.O. (%)	Sp.Con. (µS/cm)	pH	Redox (mV)
0.5	6.5	8.66	70.4	136.8	7.28	144.3
1	6.3	9.11	73.8	136.7	7.28	144.5
2	6.3	8.88	72.0	136.9	7.25	146.0
3	6.3	8.50	69.5	136.8	7.24	146.2
4	6.3	9.13	73.9	137.0	7.24	147.0
5	6.3	8.40	68.0	137.0	7.24	147.2
6	6.2	8.45	68.3	137.1	7.23	147.8
7	6.2	8.43	68.4	137.1	7.21	148.1
8	6.1	8.42	67.8	137.1	7.20	149.1
9	6.0	8.41	67.6	137.1	7.22	149.0
10	6.0	8.42	67.7	137.1	7.21	150.1
11	6.0	8.19	65.9	137.6	7.21	150.2

Profile - Site SWI (Profile for the way up)			**11:45-12:30**			
Depth (m)	Temp. (°C)	D.O. (mg/L)	D.O. (%)	Sp.Con. (µS/cm)	pH	Redox (mV)
11	6.1	8.21	66.1	152.1	6.92	150.5
10	6	8.43	67.8	137.1	7.2	144.8
9	6	8.72	70.3	137	7.2	144.2
8	6.1	8.52	68.6	137	7.22	141.7
7	6.1	8.45	68.2	137	7.22	141.6
6	6.2	8.36	67.4	136.9	7.22	141.9
5	6.3	9.01	73	136.9	7.22	143.6
4	6.3	8.54	69.1	136.8	7.23	143.1
3	6.3	8.8	70.9	136.9	7.24	143.5
2	6.3	8.77	70.9	136.9	7.26	143.4
1	6.3	8.84	71.8	136.8	7.27	143.6
0.5	6.5	8.76	71.4	136.7	7.27	143.9



Felt bottom at 11.3 m