



Water Science and Stewardship Audit Report Keno - Formo

April 15, 2026



Preface

The opinions and recommendations expressed in this report are based on field observations and relevant scientific data, reports, interpretations and analyses that are available to Government of Yukon's Water Science and Stewardship Branch (WSS). However, we strive to recognize diverse ways of knowing and being and to create space to learn from both Indigenous and scientific perspectives side-by-side.

While WSS provides support to inspectors on enforcement and compliance matters related to water licences, it is not WSS's role to determine or enforce compliance. As such, the findings of this report should not be considered as a determination of compliance with any existing permit or licence.

Executive summary

The Formo historical mine workings, operational from 1929 to 1961, are located near the town of Keno on the north side of the Silver Trail highway. These workings were the subject of a Phase II Environmental Site Assessment (ESA) in 1997-1998, which identified contaminant loadings to Christal Creek from the waste rock pile and flowing adit discharge. Zinc was identified as a primary contaminant of concern.

The Formo site is up and downstream of active mining (Hecla), and remediation efforts (ERDC), but is not part of the ongoing remediation works. Government of Yukon's (YG) Water Science and Stewardship Branch (WSS) visited the site in 2018 as part of a wider Keno audit and collected water quality samples, but there was minimal work up of this data at the time.

Based on water quality and flow data collected during the present study, the Formo system did not appear to alter concentrations of dissolved constituents in Christal Creek during the Spring 2024 monitoring event. At the time of the site visit, flow conditions were expected to be near the highest point in the year, which may result in dilution of effects of the mine workings on the receiving environment water quality.

No clear change is observed in the waters of the Formo system from historical sampling events to the present study, although lack of historical data prohibits statistical analysis and significance assessments.

Acronyms and abbreviations

Acronym/Abbreviation	Definition
ADV	Acoustic Doppler Velocimeter
AMP	Adaptive Management Plan
BV	Bureau Veritas
CALA	Canadian Association for Laboratory Accreditation
CCME	Canadian Council of Ministers of the Environment
CIRNAC (INAC)	Crown-Indigenous Relations and Northern Affairs Canada
DOC	Dissolved Organic Content
ESA	Environmental Site Assessment
GNIP	Global Network of Isotopes in Precipitation
QA/QC	Quality Assurance/Quality Control
PAL	Protection of Aquatic Life (as referenced by CCEM guidelines)
RPD	Relative Percent Difference
TOC	Total Organic Content
PWGSC	Public Works and Government Services Canada
TSS	Total Suspended Solids
UWEIL	University of Waterloo Environmental Isotopes Laboratory
WQO	Water Quality Objective
WSS	Water Science and Stewardship Branch, formerly Water Resources Branch
YG	Yukon Government
YG-CSR	Yukon Government Contaminated Sites Regulation

Table of Contents

Preface.....	0
Executive summary.....	0
Acronyms and abbreviations.....	1
1 Introduction.....	4
1.1 Site history.....	4
1.2 Environmental and regulatory context.....	6
2 Audit purpose and objectives.....	7
3 Methods.....	8
3.1 Desktop review.....	8
3.2 Field methods.....	8
3.2.1 Water quality sampling.....	8
3.2.2 Flow measurements.....	12
3.3 Quality Assurance/Quality Control (QA/QC).....	12
4 Results.....	14
4.1 Site visit results.....	14
4.1.1 Site observations.....	14
4.1.2 Field Data.....	14
4.1.3 General geochemistry.....	14
4.1.4 Laboratory results and standard comparisons.....	15
4.1.5 Flow measurements.....	18
4.1.6 Adit water loading calculations.....	18
4.1.7 Comparison with historical data.....	19
4.1.8 Stable water isotope results.....	22

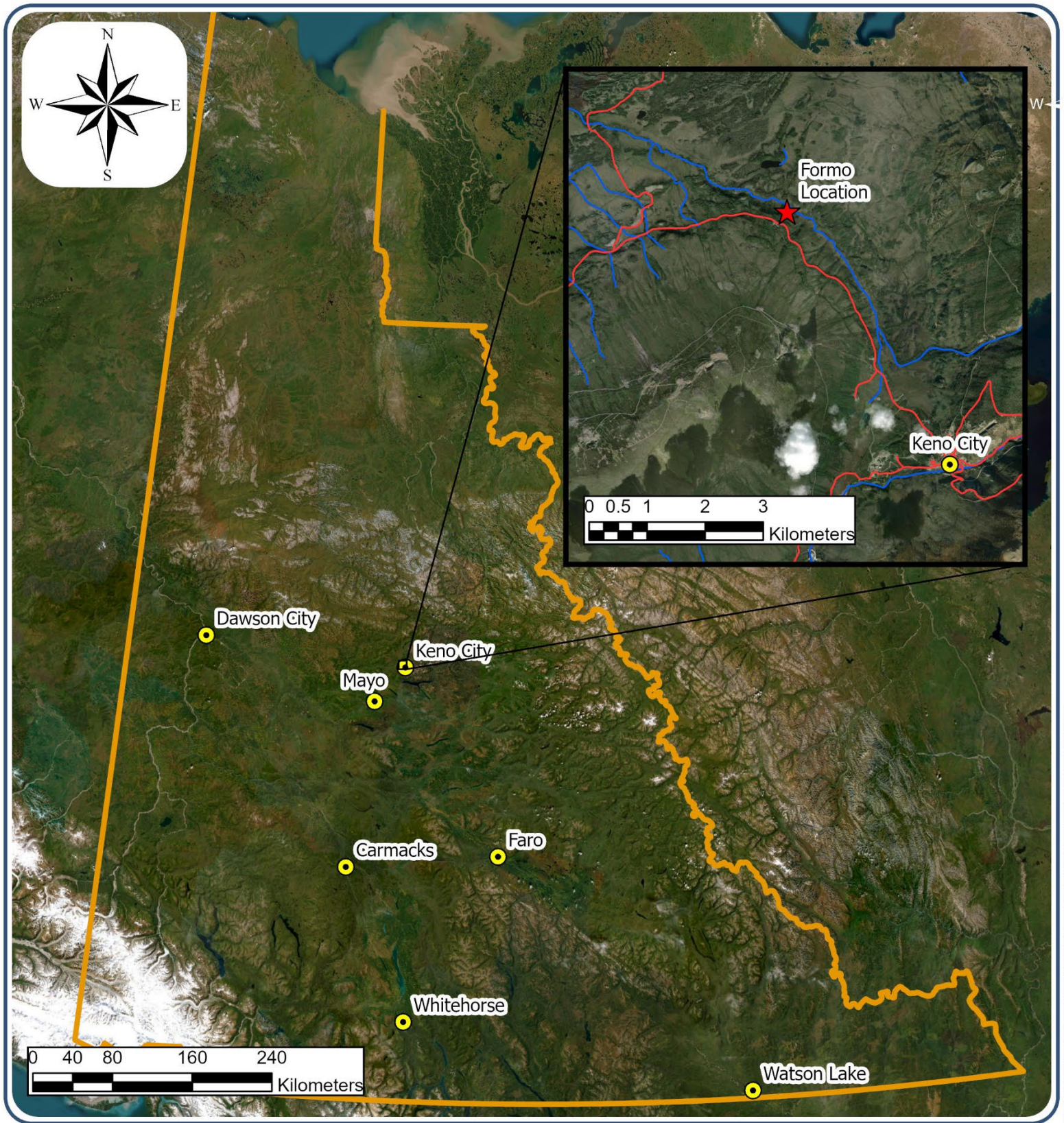
4.2	QA/QC results	23
4.2.1	Geochemistry.....	23
4.2.2	Stable water isotopes	23
4.2.3	Flow measurements	24
4.3	Summary of results	24
5	Discussion.....	26
5.1	Objective 1: Characterize the impacts of the Formo adits and associated mine wastes on the water quality of Christal Creek.....	26
5.2	Objective 2: Assess whether these influences have changed since the most recent and historical rounds of water quality sampling	27
6	Conclusions and recommendations	28
7	Contact Information	29
	References.....	30
	Appendices	31
	Appendix A: Photo Log.....	31
	Appendix B: Analytical Results.....	34

1 Introduction

1.1 Site history

The Formo mine site is located approximately 5 km north of the town of Keno, on the north side of the Silver Trail highway. In its current state, the historical mine site comprises two collapsed adits and a waste rock pile which was subject to a series of mass wasting events. These events resulted in waste rock sliding into Christal Creek, which runs through the valley underlying the mine workings. The Formo mine was initially staked in 1921 and saw intermittent activity and ore exporting from 1929 to 1961. A total of approximately 180 tons of ore were shipped throughout the lifespan of the mine (Yukon Geological Survey 2021). Metallic Minerals acquired the site in 2017 and has been conducting assessments since, but no known plans are currently in place to bring the mine back into operation.

The geology of the Formo mine area is characterized by carbonate gangue with lenses of galena, sphalerite and minor tetrahedrite. There is some modern interest in the mine as evidenced by promising exploration results obtained through drilling carried out by Metallic Minerals in 2024 (Metallic Minerals 2024). The principal minerals of interest discovered during this exploratory drilling were silver, gold, lead and zinc. The deposit was classified as in the “advanced exploration stage” and “resource ready” (Metallic Minerals 2024). The location of the Keno Formo area is presented in Figure 1.



G:\water\Maps\GIS\01_Projects\1000_Keno_Formo\Master.aprx modified on: March 12, 2025 2:16 PM by cantische

	Formo Location		Roads
	Place Names		Watercourse

Figure 1
Audit Location
MARCH 2025




Figure 1 - Audit Location

1.2 Environmental and regulatory context

Site hydrology is characterized by a uniform north-facing slope towards Christal Creek, channeling all site drainage to this receiving watercourse. The principal discharge pathways from the mine workings to Christal Creek comprise two historical seasonal seeps in the waste rock pile and discharge from the flowing adit (labelled as (FORMO-01)). Mean annual precipitation in the area is approximately 27 mm, and the mean annual temperature is approximately -6 °C (PWGSC 1998).

The Formo site is up and downstream of active mining (Hecla), and remediation efforts (ERDC), but is not part of the ongoing remediation works. A Phase III Environmental Site Assessment (ESA) was commissioned in 1998 by Crown-Indigenous and Northern Affairs Canada (CIRNAC, INAC at the time) and completed by the Environmental Services branch of Public Works and Government Services Canada (PWGSC) (PWGSC, 1998). This study identified zinc as a primary contaminant of concern as well as waste rock pile instability and acid generation potential. In the Phase III report, it is suggested that absolute concentrations of many dissolved metals are highest in the spring season, but that concentrations upstream and downstream of the mine workings are most different in lower flow periods such as the fall season. Government of Yukon's (YG) Water Science and Stewardship Branch (WSS) visited the site in 2018 as part of a wider Keno audit and collected water quality samples, but there was minimal work up of this data at the time. In January 2024, Metallic Minerals announced a mineral resource estimate for Keno-Formo based on ongoing exploration work.

2 Audit purpose and objectives

The primary objectives of the 2024 audit are to:

1. characterize the impacts of the Formo adits and associated mine wastes on the water quality of Christal Creek; and
2. assess whether these influences have changed since the most recent and historical rounds of water quality sampling.

3 Methods

Objectives were accomplished through the following field and desktop activities:

1. completing a sampling event to determine the separate influences of waste rock deposits, local seepage and adit water discharge on Christal Creek;
2. collecting flow measurements from Christal Creek to provide an estimate of contaminant loading;
3. collecting and analyzing samples from the waste rock piles from oxic and anoxic zones if possible adjacent to seep locations;
4. analyzing stable water isotope and aqueous geochemical data to determine water sourcing and inform geochemical processes; and
5. comparing modern data with historical data to assess temporal changes.

3.1 Desktop review

Historical reports, principally the 1998 Phase III ESA and the 2018 WSS audit, were reviewed to refine site understanding and inform comparisons of data collected during the present study with historical data. Available data in the WSS EQWin water quality data repository was reviewed and updated to support data analysis. All data visualizations were completed in R.

3.2 Field methods

3.2.1 Water quality sampling

Efforts were made to place all sample locations for the present study in locations capturing similar waters to previously collected samples from the 1998 Phase III and the 2018 WSS audit of the same area to facilitate data entry and analysis. Location data for field data collection sites is presented in Table 1.

Table 1 - Water quality sampling and flow measurement locations

Location ID	Station type	Latitude	Longitude
FO-WQ-ST1-1	Water quality - SW	63.945600°	-135.359340°

FO-WQ-ST1-2	Water quality - SW	63.945909°	-135.360741°
FO-WQ-ST1-3	Water quality - SW	63.947295°	-135.365552°
KF-SW-DS-1	Water quality - SW	63.946962°	-135.363373°
KF-FLOW-US	Flow	63.945603°	-135.359766°
KF-FLOW-DS	Flow	63.947303°	-135.366336°
FORMO-01	Water quality - ADIT	63.944986°	-135.366554°
KF-ADIT-LOWER	Water quality - ADIT	No flow – not sampled	
FO-WQ-SE-1	Water quality - SEEP	No flow – not sampled	
FO-WQ-SE2-1	Water quality - SEEP	No flow – not sampled	

Field work was conducted on May 21, 2024. Surface water sampling was carried out by Cole Fischer (Groundwater Technologist) and Taylor Belansky (WSS GradCorps). All samples were collected as grab samples. Field parameters were measured using a YSI multiparameter sonde, calibrated on the day of sampling. Samples were collected from all points designated in the sampling plan. Stable water isotope samples were also collected from all surface water sampling locations. Water quality and stream flow monitoring stations are presented in Figure 2.

All water samples were preserved and filtered in the field as per laboratory directions, then placed on ice within five minutes of sample collection for transport to the lab. If samples were being stored overnight at the WSS facility, they were kept at less than 5 °C and delivered to the lab in the morning. Water quality samples were analyzed by Canadian Association for Laboratory Accreditation (CALA)-accredited laboratory Bureau Veritas (BV) and all water isotope samples were analyzed by the University of Waterloo Environmental Isotopes Lab (UWEIL). Samples were analyzed for total and dissolved metals, arsenic speciation, total and dissolved organic content (TOC/DOC), chloride, nitrogen species, general geochemistry (pH, hardness, conductivity, total suspended solids (TSS), alkalinity), ammonia and cyanide.

Analytical parameters for surface water samples are compared to the Canadian Council of Ministers of the Environment – Protection of Freshwater Aquatic Life (CCME-PAL) standards. Where guidelines do not exist for dissolved constituents, guidelines for total concentrations are used in place.

3.2.2 Flow measurements

Discharge measurements were carried out by Tyler DeJong (Water Data Scientist) and Emma Marnik (WSS STEP). Two flow measurements were conducted as a part of the present study to compare flow rates in Christal Creek above and below the Formo mine workings, presented in Figure 2. The upstream flow measurement was collected approximately 250 m upstream of the failed waste rock pile, and the downstream station was placed approximately 500 m downstream of the area in which discharge from the mine would be expected to report to Christal Creek (Photo 6).

Flow measurements were conducted using a SonTek FlowTracker 2 Handheld Acoustic Doppler Velocimeter (ADV). Flow measurements were conducted in 10 cm intervals from bank to bank to capture sufficient resolution for accurate flow calculations.

Flow data was analyzed using the FlowTracker2 software, which provides measures of accuracy and data visualizations.

3.3 Quality Assurance/Quality Control (QA/QC)

Quality Assurance/Quality Control (QA/QC) controls were implemented into all sampling programs. These controls took the form of one duplicate sample to monitor precision.

Analysis of the relative percent difference (RPD) of individual analytes between duplicate samples provides an indication of sample precision. Values of less than 25% are generally considered acceptable, considering the Practical Qualifying Limit (PQL) which accounts for how close measurements are to the reported detection limit (RDL). Relative percent difference values are calculated using the equation:

$$RPD = \frac{R_1 - R_2}{\left(\frac{R_1 + R_2}{2}\right)} \times 100\%$$

Comparison between field and lab measurements provides an indication of field accuracy. An RPD of less than 10% is generally considered acceptable for field versus lab pH measurements, as this parameter is sensitive to changes in temperature and

exposure to atmospheric gases. Specific conductance between field and lab measurements is considered acceptable when RPD values do not exceed 20%.

4 Results

4.1 Site visit results

4.1.1 Site observations

The site was free of ice and snow at the time of the visit. The historical access route to the waste rock pile is heavily overgrown and makes for difficult passage. Staff members were able to make their way to the flowing adit (FORMO-01, Photo 1) and then bushwhack to the point on the creek where full mixing would be expected to have occurred across upstream creek waters, potential flowing adit water and potential influence of the waste rock pile (Photo 3). The visible portion of the adit was mostly icebound with the discharging water from the adit running through a channel in the ice (Photo 2).

4.1.2 Field data

Field geochemical data collected during the 2024 sampling event is presented in Table 2. The geochemical signatures for all creek samples are similar, with the exception of slightly lower pH and slightly higher conductivity at FO-WQ-ST1-3.

Table 2 - Field data collected during the Spring 2024 site visit

Location ID	Temperature (°C)	pH	Turbidity (NTU)	Specific Conductance (µS/cm)	ORP (mV)	Dissolved Oxygen (mg/L)
FO-WQ-ST1-1	4.7	7.81	-41	482	129.7	12.2
FO-WQ-ST1-2	4.9	7.76	-41.4	500	117.2	12.17
FO-WQ-ST1-3	4.3	7.59	-39.94	501	155.1	12.37
KF-SW-DS-1	4.5	7.69	-41.5	499.9	122.4	12.32
FORMO-01	1.8	7.68	-47.16	2101	145.1	13.07

4.1.3 General geochemistry

The general chemistry of a water sample can be described by comparing the relative concentrations of major cations and anions. The primary water types observed in the present study are Ca-SO₄, with Mg-HCO₃ as a secondary type. The sample collected

from the flowing adit appears to be slightly geochemically distinct from all other samples, showing a slightly higher relative abundance of Mg and SO₄. The general geochemistry results are presented as a piper plot in Figure 3.

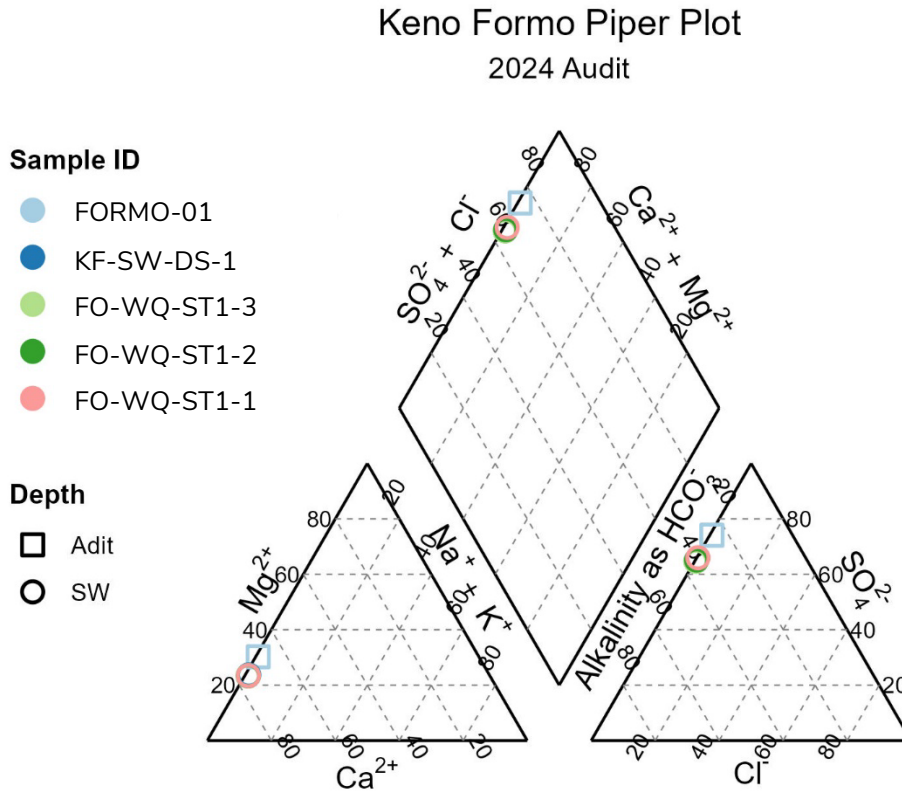


Figure 3 - General geochemistry of the Formo system waters

4.1.4 Laboratory results and standard comparisons

Reporting on geochemical parameters in the current study is generally limited to parameters that exceeded CCME guidelines in previous and current studies. Full chemistry results are available in Appendix B.

A summary of geochemical results is presented in Figure 4. Horizontal dash marks indicate relevant CCME standards. The sample collected from the flowing adit, FORMO-01, is not a part of the flowpath indicated on figure x-axes, but discharging water is expected to report to Christal Creek between FO-WQ-ST1-2 and KF-SW-DS-1.

As with the general geochemistry results, adit discharge water appears to show a distinct geochemical signature in dissolved constituents. Adit water shows lower concentrations of Al, As-D, Cu, Fe, Pb and Se, while showing higher concentrations of As-T, Cd, Ni, U and much higher Zn. In some cases, such as with total As, Cd and Zn, the discharging water from the adit exceeds relevant CCME guidelines.

The guideline for zinc is derived from an equation accounting for pH, hardness and dissolved organic carbon. An upper limit for hardness constrains guideline calculations for this parameter and the waters around the Formo system are very near or in excess of that limit, which is beyond what the derivation of the guideline was based on. However, concentrations of total zinc are noted to exceed the Keno Adaptive Management Planning (AMP) water quality objective (WQO) for FORMO-01 (the flowing adit). Calculated guidelines applied to the data presented in Figure 4 are calculated using the maximum hardness value and an averaged DOC and pH across all samples.

The final sample in the analyzed audit flow path (downstream of all expected Formo influences, FO-WQ-ST1-3), shows slightly increased concentrations of Ag-T, Al-T, As-T, Cu-T, Fe-T and Pb-T. Of these parameters, As-T is the only parameter that is higher in the adit discharge than the creek.

Keno Formo Water Quality Results

Water Resources Branch Audit, 2024

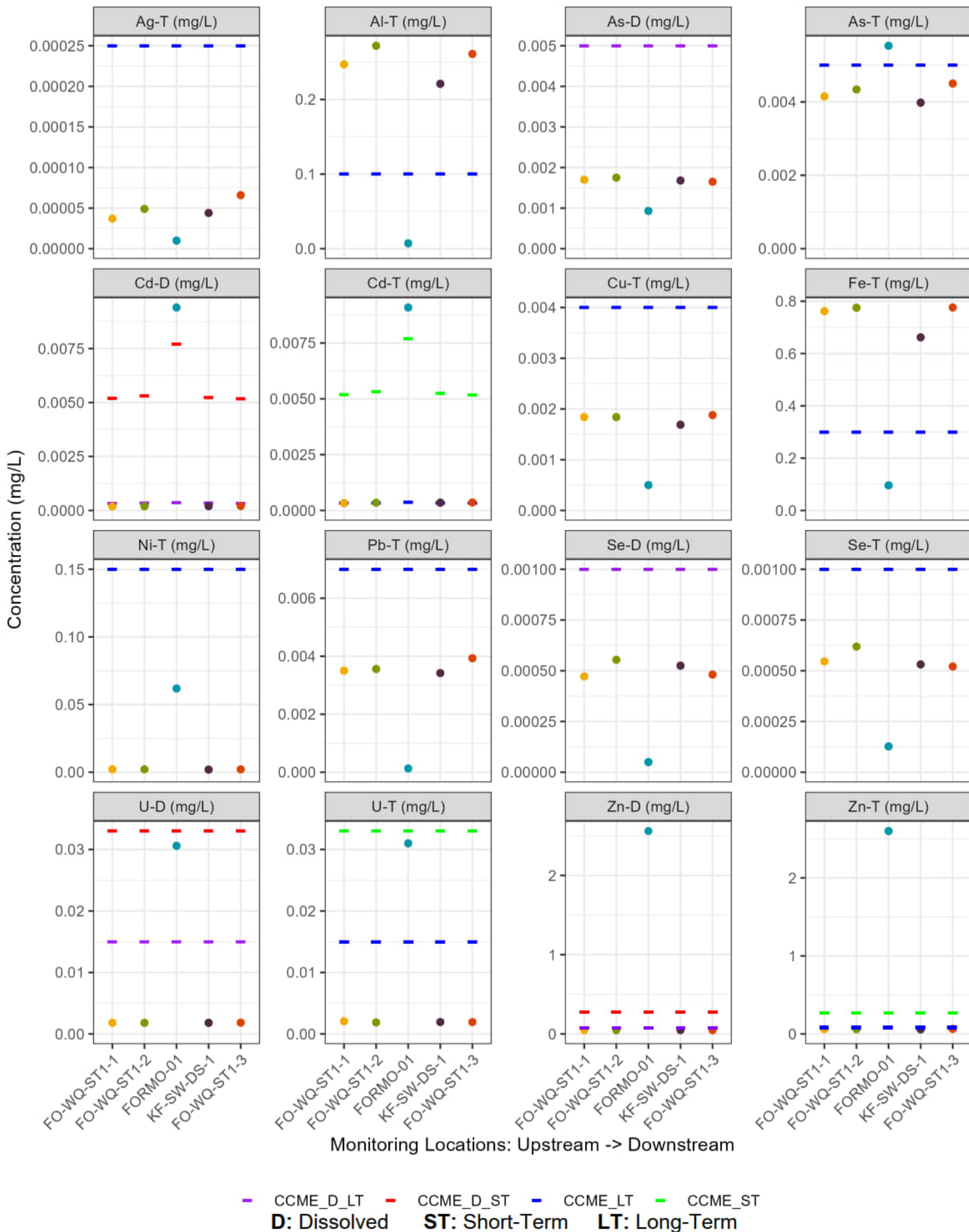


Figure 4 - Analytical Results for Selected Parameters

4.1.5 Flow measurements

Flow data collected using the ADV was analyzed using the FlowTracker software suite and is presented in Figure 5. Calculated discharge was 0.275 m³/s at the upstream measurement location and 0.280 m³/s at the downstream station, a net increase of 0.005 m³/s or 5 L/s. As discussed in the QA/AC section, this measurement is within the margin of error of the instrument (Overall error of 3%, or 8 L/s) and cannot be taken as solid evidence of an increase in flow upstream to downstream of the mine workings (adit and waste rock pile).

The flow rate from the adit was visually estimated at approximately 1 L/s and appeared to be influenced by the melting ice present in the adit entrance.

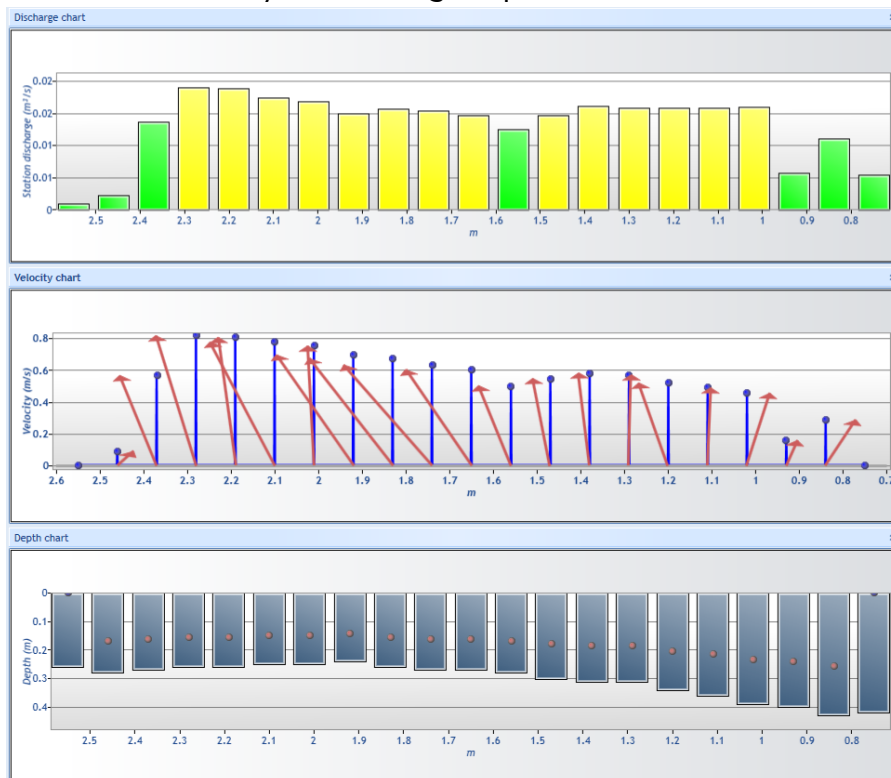


Figure 5 - FlowTracker stream gauging results

4.1.6 Adit water loading calculations

Based on the visually estimated flow rate (~1 L/s) from the flowing adit, loading calculations were conducted for parameters that show higher concentrations in the adit water than in Christal Creek (Table 4).

Table 3 - Load calculations from adit relative to observed differences in the creek for dissolved metals with elevated adit concentrations compared to the creek and typically conservative tracers chloride and sulphate

Parameter	Adit / Upstream concentration ¹	FO-WQ-ST1-1 load (mg/s) ²	FO-WQ-ST1-3 load (mg/s) ²	Upstream downstream difference (mg/s)	Adit load (mg/s) ³
Zn-D	56	12.6	12.8	0.23	2.56
Cd-D	51	0.050	0.057	0.0076	0.0094
Ni-D	45	0.37	0.38	0.007	0.061
U-D	17	0.50	0.52	0.018	0.031
Chloride	10	173.3	179.2	5.95	6.04
Sulphate	6	41,800	42,840	1,040	903

¹ concentration ratio between the adit and creek station FO-WQ-ST1-1

² Loads calculated by applying the upstream flow location to FO-WQ-ST1-1 and the downstream flow location to FO-WQ-ST1-3

³ adit load estimated based on visual approximation of 1 L/s flow

Chloride and sulfate typically behave conservatively in geochemical systems, meaning they are less likely than other parameters to attenuate during flow path progression. Concentrations of conservative tracers, when coupled with flow volumes, can provide an estimation of mixing ratios between two water sources.

The addition of chloride and sulfate to Christal Creek from the Formo adit appear to mostly account for an increase from upstream to downstream of these parameters, indicating adit water is mixing with the creek. The minimal increase in other parameters may be indicative of attenuating factors removing these parameters from the flow path.

4.1.7 Comparison with historical data

Comparison of historical water quality results with those collected during the present study are presented in Figure 6, although the lack of a robust historical dataset prohibits meaningful statistical comparison of data collected during the present study with historical data. Guideline comparisons are omitted from this figure to improve readability.

Some differences are observed between water quality results from the late 1990s study to modern results (2018 and 2024), with more pronounced effects for certain stations and parameters. Water quality parameters collected during the present study appear to be slightly lower than previous sampling events, but the data set is

insufficient to draw broad conclusions regarding water quality trends from historical sampling events to the present study.

Keno Formo Water Quality Results

Water Resources Branch Audit, 2024



Figure 6 - Comparison of historical data with those collected during the present study. Legend entries show month and year of sampling.

4.1.8 Stable water isotope results

Analysis of stable water isotopes, or the ratio of heavier to lighter O and H atoms in water molecules, can assist with the identification of water source. Water molecules containing greater proportions of heavier isotopes (O^{18} , H^2) precipitate more readily from atmospheric water and resist evaporation from stagnant water, meaning water bodies subject to rainfall and evaporation will become enriched in O^{18} and H^2 (upper right portion of water isotope charts). Inversely, water bodies with little exposure to atmospheric influences or fed principally by snowmelt (i.e. groundwater) tend to be more enriched in lighter isotopes O^{16} and H^1 (bottom left portion of chart). Stable water isotope results are generally plotted alongside the local meteoric water line (LMWL), representative of the typical isotope fractionation in meteoric water (precipitation, rain and snow) for a designated area. Comparison of sample data with the LMWL informs conclusions regarding the source of a given water sample. Stable water isotope data for the present study are presented in Figure 7.

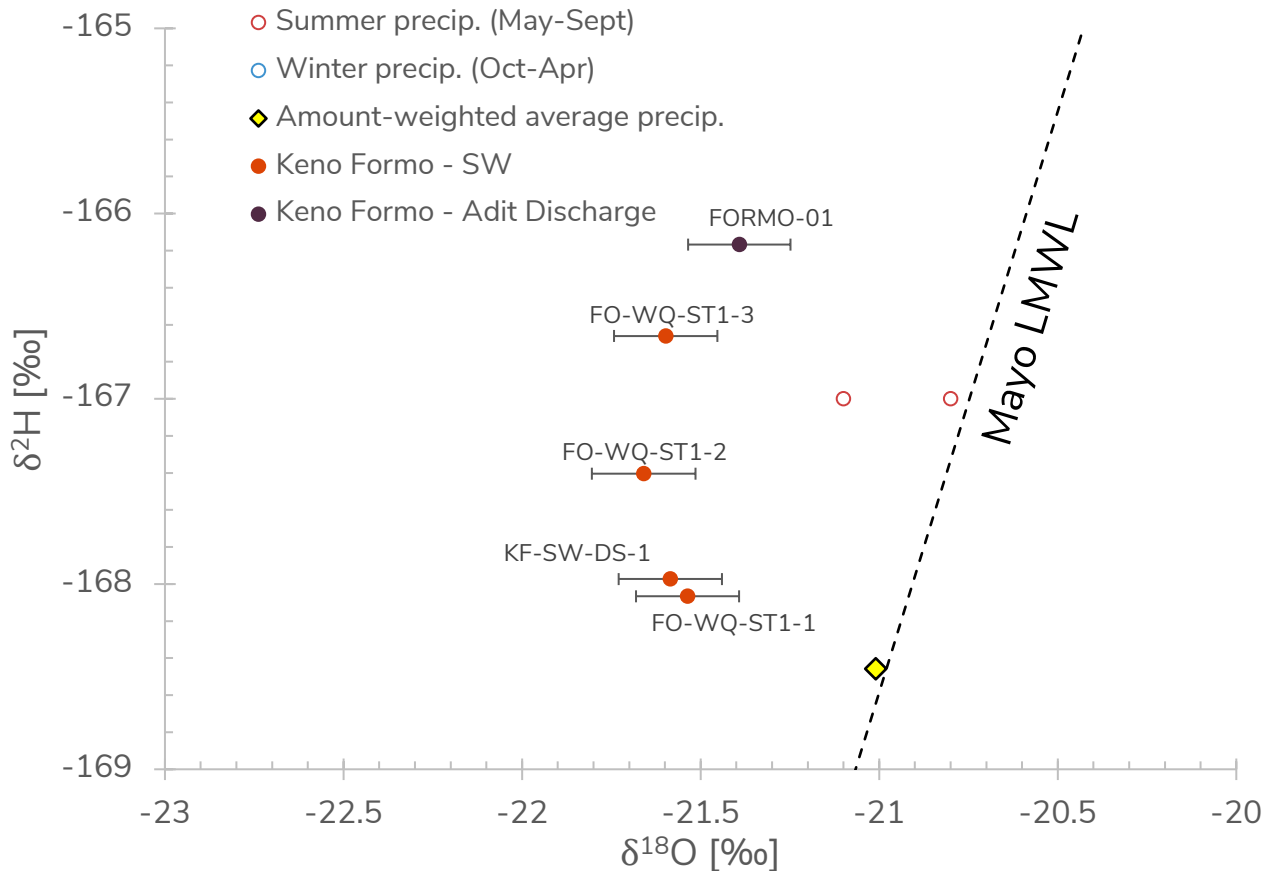


Figure 7 - Stable water isotope results. Y-axis error bars are too small to be visible on the graph.

All data points collected from the Formo system show a higher $\delta^2\text{H}$ and a lower $\delta^{18}\text{O}$ than the amount weighted average precipitation for the area. The sample collected from the adit shows the same trend in relation to the other samples, with a slightly higher $\delta^2\text{H}$ and lower $\delta^{18}\text{O}$.

Stable water isotope signal evolution shows a potential progression downstream towards a signal more similar to that observed in the flowing adit in $\delta^2\text{H}$. From the furthest upstream point in the flow path (FO-WQ-ST1-1) to the furthest downstream (FO-WQ-ST1-3), samples become more enriched in H^2 , with the signal from the flowing adit the most enriched in H^2 of all audit samples. This progression may be indicative of the influence of H^2 -enriched adit waters on Christal Creek but the small samples size prohibits statistical calculations.

The progression of $\delta^{18}\text{O}$ does not show a similar trend, as the greater percentage error for that measurement prohibits comparison between samples.

4.2 QA/QC results

4.2.1 Geochemistry

Melting ice may influence sampling results, as outflowing adit water was observed flowing through an ice channel leaving the adit. A duplicate sample was collected alongside the sample from within the footprint of the failed waste rock pile (FO-WQ-ST1-2). The relative percent difference (RPD) of all samples was less than 20%, save for ammonia which was calculated at 23%. The cause of this increased RPD for this parameter is not known but given the good agreement of the rest of the data set, this discrepancy is likely not an indicator of a systemic flaw in data collection or analysis.

4.2.2 Stable water isotopes

Based on replicate measurements conducted by the UWEIL, the average RPD for $\delta^2\text{H}$ and $\delta^{18}\text{O}$ was less than 1%, enabling high confidence in the accuracy of results.

4.2.3 Flow measurements

Flow measurements from both the upstream and downstream locations show an overall error of approximately 3%, or 8 L/s. Since the difference between the upstream and downstream stations was approximately 5 L/s, it cannot be stated with certainty that an increase in flow is observed between the two stations because of adit water or other sources.

4.3 Summary of results

Water types of the samples collected in the present study are primarily Ca-SO₄, with Mg-HCO₃ as a secondary type. The sample collected from the adit appears to more closely resemble the second general water type than the other samples.

Upstream of the Formo system, creek waters exceeded CCME guidelines at the time of sampling for Al-T, Cd-T and Fe-T. The only flowing audit in the Formo system, FORMO-01, exceeded CCME guidelines for As-T, Cd-D, Cd-T, U-D, U-T and Zn-T at the time of sampling. Concentrations of Zn-T from the flowing audit are approximately two orders of magnitude greater than those in the creek. In Christal Creek downstream of the flowing adit, at which point full mixing would be expected to occur (FO-WQ-ST1-3), no new exceedances different from upstream were observed at the time of sampling.

Adit water shows a distinct geochemical signature and higher concentrations of As, Cd, U and Zn, and lower concentrations of Al, Cu and Fe. In some cases (As, Cd, U) adit water exceeds CCME guideline where values in Christal Creek do not. However, concentrations of Fe exceed guidelines in the creek but not in the adit water.

Scarcity of historical data hinders comparison of results from the present study with previously collected data from Christal Creek. Concentrations of some parameters appeared to be higher in the 1997 to 1998 sampling events than those collected in the 2018 and 2024 sampling events, but the limited number of data points prohibits meaningful statistical analysis of long-term trend in Christal Creek water quality.

The stable water isotope signature of the adit water is slightly distinct from those collected from the creek, more closely resembling the average isotope values for

summer precipitation. Based on conditions observed at the time of sampling, this isotope signal may be influenced by the presence of melting water. As water progresses down the Christal Creek flow path, $\delta^2\text{H}$ increases, with the adit water having the greatest $\delta^2\text{H}$.

5 Discussion

5.1 Objective 1: Characterize the impacts of the Formo adits and associated mine wastes on the water quality of Christal Creek

Based on geochemical data, and calculated loading rates, the Formo adit system did not appear to negatively influence the water quality on Christal Creek at the time of the sampling event, although analysis is limited by the scarcity of data. However, loading calculations indicate that concentrations of conservative tracers are increased in the receiving environment by the Formo system. The lack of increased concentrations of other parameters alongside the increase in these conservative tracers may indicate an attenuating effect exerted on certain parameters in the areas between the flowing adit and the creek. Due to this attenuating effect, concentrations of other analyzed parameters of interest in the Formo system (principally metals and metalloids) did not appear to increase significantly from upstream to downstream of site workings at the time of the site visit. The two main sources of potential contamination (the waste rock pile and the area of confluence of adit water discharge with Christal Creek) were both bracketed by monitoring locations in the present study to assess potential influences, but no significant changes in water chemistry appeared to have been induced by either feature at the time of sampling.

The stable water isotope signal observed in the adit discharge water provides evidence of melting ice that may hide the true signal of liquid adit water. Generally, adit discharge stable water isotope signals would be expected to resemble local groundwater which tends to be driven by snowmelt rather than summer precipitation, leading to enrichment in heavier isotopes. However, the adit signature in the present study shows a signal depleted in heavy isotopes due to preferential early season melting of lighter isotopes from solid phase. Sampling later in the year, when the adit is free of ice, may provide more useful isotope data regarding the source of adit discharge. Later-season meltwater would be expected to become progressively more

enriched in heavier water isotopes as melt fractionation progresses and may become more representative of Formo system groundwater.

It is likely that waters from the adit do discharge into Christal Creek, but parameters of concern like aluminum may be subject to an attenuating influence before the flow from the adit reaches the creek. Sample numbers would need to be increased to assign any statistical significance to this proposed effect. Seasonal fluctuations in stream flow may change these findings, as reduced flow rates in Christal Creek such as those observed during typical fall seasons would reduce dilution effects and may highlight geochemical loading from the Formo system.

5.2 Objective 2: Assess whether these influences have changed since the most recent and historical rounds of water quality sampling.

Limited historical sampling data prohibits statistical analysis of changes in water quality with data collected during the present study. Concentrations of certain parameters at certain locations appear to be lower than those observed in the 1997 Phase III ESA, but the sample size is insufficient to make statistical comparisons.

Data collected during the Phase III ESA in the late 1990s shows exceedances of some guidelines, also observed in samples collected during the present study. The 1990s report mentions zinc as a key parameter of concern, and in the present study zinc does exceed CCME guidelines in the flowing adit water, but not at any point in Christal Creek. Geochemical loading rates of zinc to Christal Creek exceeds that of most other parameters (in some cases by multiple orders of magnitude), providing preliminary confirmatory evidence of zinc as a parameter of concern in discharging adit water as identified in the Phase II ESA. These high concentrations do not appear to increase concentrations in Christal Creek, likely due to adit water flowpath attenuating or dilution effects.

6 Conclusions and recommendations

At the time of sampling of the present study, the Formo historical mine workings do not appear to negatively impact the water quality of Christal Creek, potentially due to attenuating effects along the adit water discharge flowpath or dilution effects of the creek.

Future work could focus on sampling water quality in Christal Creek during the fall season or as near to baseflow conditions as possible in the vicinity of the Formo system. This would serve to characterize the diluting effect of creek water on any potential influence of the Formo system on water quality and may highlight any changes exerted on water chemistry not observed in the present study.

7 Contact Information

Audit Lead: Cole Fischer, Senior Groundwater Scientist: Cole.Fischer@yukon.ca

Reviewers: Tyler Williams, Water Resource Scientist: Tyler.Williams@yukon.ca

For more information about this report contact: waterscience@yukon.ca

References

1. Metallic Minerals. Metallic Minerals Drills 46 Meters of 256 g/t Ag Eq including 3.3 Meters at 1,413 g/t Ag Eq at the Formo Target, Keno Silver Project in Yukon, Canada. January 10, 2024. https://metallic-minerals.com/site/assets/files/2554/2024-01-10-metallic_minerals_announces_keno_drill_results-final.pdf
2. PWGSC,. Phase II Environmental Assessment, Formo Mine Site, Final Report. June 1998. https://emrlibrary.gov.yk.ca/emrlibrary/cw/m1998_05.pdf
3. Yukon Geological Survey. Occurrence Details: Work History. Published 2021. <https://data.geology.gov.yk.ca/Occurrence/13646#WorkHistoryTab>.

Appendices

Appendix A: Photo Log



	<p>Photo No.: 1</p> <p>Taken by: CF</p> <p>Date: May 21, 2024</p> <p>Direction: S</p> <p>Entrance to flowing adit</p>
	<p>Photo No.: 2</p> <p>Taken by: CF</p> <p>Date: May 21, 2024</p> <p>Direction:</p> <p>Description: Ice channel with flowing adit discharge</p>



Photo No.: 3

Taken by: CF

Date: May 21, 2024

Direction: N

Description: Expected pathway for adit discharge to Cristal Creek



Photo No.: 4

Taken by: CF

Date: May 21, 2024

Direction: E

Description: Waste rock pile from above



Photo No.: 5

Taken by: CF

Date: May 21, 2024

Direction: S

Description: Waste rock pile from below



Photo No.: 6

Taken by: CF

Date: May 21, 2024

Direction: E

Description: Flow measurements in footprint of waste rock pile failure

Appendix B: Analytical Results

NOTE: Sample IDs were changed post-sampling to align with those previously samples in the Phase III ESA. The sample IDs that were changed are:

1. KF-SW-IF » FO-WQ-ST1-2
2. KF-SW-DS-2 » FO-WQ-ST1-3
3. KF-ADIT-MIDDLE » FORMO-01



CERTIFICATE OF ANALYSIS

Work Order : **VA24B1414**
Client : **Government of Yukon**
Contact : Nicole Novodvorsky
Address : Department of Environment, Environmental Protection and
 Assessment Branch 419 Range Road
 Whitehorse YT Canada Y1A 3V1
Telephone : 867-456-6538
Project : Keno Formo Audit
PO : ----
C-O-C number : ----
Sampler : ----
Site :
Quote number : WR22-GYPT100-002 (Do Not Use, Duplicate, use VA23---002)
No. of samples received : 6
No. of samples analysed : 6

Page : 1 of 10
Laboratory : ALS Environmental - Vancouver
Account Manager : Tasnia Tarannum
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 22-May-2024 13:02
Date Analysis Commenced : 24-May-2024
Issue Date : 30-May-2024 17:59

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Ilnaz Badbezanchi	Supervisor - Metals Prep & Mercury	Metals, Burnaby, British Columbia
Kelly Fischer	Technical Specialist	Inorganics, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Leon Yang	Analyst	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Sam Silveira	Analyst	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

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

<i>Unit</i>	<i>Description</i>
-	no units
µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

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



Analytical Results

Sub-Matrix: Surface Water

Client sample ID

(Matrix: Water)

					KF-DUP	KF-SW-IF	KF-SW-DS-1	KF-SW-DS-2	KF-ADIT-MIDDLE
					21-May-2024 00:00	21-May-2024 16:30	21-May-2024 16:15	21-May-2024 15:50	21-May-2024 17:50
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24B1414-001	VA24B1414-002	VA24B1414-003	VA24B1414-004	VA24B1414-005
					Result	Result	Result	Result	Result
Physical Tests									
Alkalinity, bicarbonate (as CaCO3)	----	E290/VA	1.0	mg/L	103	105	104	105	364
Alkalinity, carbonate (as CaCO3)	----	E290/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	25.8
Alkalinity, hydroxide (as CaCO3)	----	E290/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	103	105	104	105	389
Conductivity	----	E100/VA	2.0	µS/cm	500	496	496	497	1960
Hardness (as CaCO3), dissolved	----	EC100/VA	0.60	mg/L	253	246	246	243	1340
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA	0.60	mg/L	250	248	251	255	1310
pH	----	E108/VA	0.10	pH units	8.26	8.27	8.27	8.27	8.45
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L	366	351	377	381	1900
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L	17.3	16.1	18.1	19.5	7.7
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	0.0111	0.0140	0.0154	0.0133	0.0156
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L	0.64	0.65	0.63	0.64	6.04
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	0.0821	0.0832	0.0836	0.0840	0.0634
Nitrate + Nitrite (as N)	----	EC235.N+N/V A	0.0050	mg/L	0.0821	0.0832	0.0836	0.0840	0.0634
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100 ^{DLDS}
Nitrogen, total	7727-37-9	E366/VA	0.030	mg/L	0.324	0.305	0.300	0.313	0.133
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L	153	152	152	153	903
Cyanides									
Cyanide, strong acid dissociable (Total)	----	E333/WT	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, weak acid dissociable	----	E336/WT	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/CG	0.50	mg/L	6.38	6.38	7.05	6.45	3.32
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	6.99	7.39	7.41	7.49	2.35
Total Sulfides									
Sulfide, total (as S)	18496-25-8	E395/VA	0.0015	mg/L	0.0017	<0.0015	<0.0015	0.0016	<0.0015
Sulfide, total (as H2S)	7783-06-4	E395/VA	0.0016	mg/L	0.0018	<0.0016	<0.0016	0.0017	<0.0016



Analytical Results

Sub-Matrix: Surface Water

(Matrix: Water)

					Client sample ID	KF-DUP	KF-SW-IF	KF-SW-DS-1	KF-SW-DS-2	KF-ADIT-MIDDLE
					Client sampling date / time	21-May-2024 00:00	21-May-2024 16:30	21-May-2024 16:15	21-May-2024 15:50	21-May-2024 17:50
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24B1414-001	VA24B1414-002	VA24B1414-003	VA24B1414-004	VA24B1414-005	
					Result	Result	Result	Result	Result	
Total Metals										
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	0.272	0.220	0.221	0.261	0.0072	
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	0.00031	0.00030	0.00030	0.00031	0.00055	
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	0.00434	0.00398	0.00398	0.00450	0.00553	
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.0476	0.0456	0.0459	0.0503	0.00374	
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000100 ^{DLA}	
Boron, total	7440-42-8	E420/VA	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.020 ^{DLA}	
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L	0.000347	0.000336	0.000349	0.000357	0.00909	
Calcium, total	7440-70-2	E420/VA	0.050	mg/L	74.6	75.4	75.8	77.5	360	
Cesium, total	7440-46-2	E420/VA	0.000010	mg/L	0.000041	0.000035	0.000033	0.000041	0.000334	
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L	0.00053	<0.00050	<0.00050	0.00051	<0.00100 ^{DLA}	
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L	0.00047	0.00043	0.00042	0.00050	0.00369	
Copper, total	7440-50-8	E420/VA	0.00050	mg/L	0.00184	0.00166	0.00169	0.00188	<0.00100 ^{DLA}	
Iron, total	7439-89-6	E420/VA	0.010	mg/L	0.775	0.669	0.662	0.776	0.096	
Lead, total	7439-92-1	E420/VA	0.000050	mg/L	0.00356	0.00324	0.00342	0.00393	0.000128	
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L	0.0048	0.0048	0.0046	0.0048	0.0090	
Magnesium, total	7439-95-4	E420/VA	0.0050	mg/L	15.6	14.6	14.9	14.9	99.3	
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L	0.206	0.191	0.189	0.210	1.33	
Mercury, total	7439-97-6	E508/VA	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L	0.000407	0.000428	0.000374	0.000405	0.000674	
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L	0.00214	0.00195	0.00191	0.00210	0.0619	
Phosphorus, total	7723-14-0	E420/VA	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.100 ^{DLA}	
Potassium, total	7440-09-7	E420/VA	0.050	mg/L	0.483	0.457	0.452	0.458	1.92	
Rubidium, total	7440-17-7	E420/VA	0.00020	mg/L	0.00082	0.00072	0.00070	0.00093	0.00334	
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L	0.000619	0.000527	0.000531	0.000521	0.000127	
Silicon, total	7440-21-3	E420/VA	0.10	mg/L	3.16	3.05	3.02	3.06	4.76	
Silver, total	7440-22-4	E420/VA	0.000010	mg/L	0.000049	0.000039	0.000044	0.000066	<0.000020 ^{DLA}	
Sodium, total	7440-23-5	E420/VA	0.050	mg/L	1.10	1.07	1.06	1.08	3.72	
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L	0.161	0.171	0.168	0.168	0.641	
Sulfur, total	7704-34-9	E420/VA	0.50	mg/L	53.5	53.0	51.6	51.3	312	



Analytical Results

Sub-Matrix: Surface Water

Client sample ID

(Matrix: Water)

					KF-DUP	KF-SW-IF	KF-SW-DS-1	KF-SW-DS-2	KF-ADIT-MIDDLE
					21-May-2024 00:00	21-May-2024 16:30	21-May-2024 16:15	21-May-2024 15:50	21-May-2024 17:50
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24B1414-001	VA24B1414-002	VA24B1414-003	VA24B1414-004	VA24B1414-005
					Result	Result	Result	Result	Result
Total Metals									
Tellurium, total	13494-80-9	E420/VA	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00040 DLA
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000020 DLA
Thorium, total	7440-29-1	E420/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020 DLA
Tin, total	7440-31-5	E420/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020 DLA
Titanium, total	7440-32-6	E420/VA	0.00030	mg/L	0.00722	0.00621	0.00640	0.00775	<0.00060 DLA
Tungsten, total	7440-33-7	E420/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020 DLA
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L	0.00188	0.00195	0.00194	0.00193	0.0310
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L	0.00095	0.00079	0.00082	0.00092	<0.00100 DLA
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L	0.0606	0.0616	0.0586	0.0648	2.60
Zirconium, total	7440-67-7	E420/VA	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00040 DLA
Dissolved Metals									
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L	0.0092	0.0090	0.0091	0.0090	<0.0020 DLA
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L	0.00024	0.00024	0.00023	0.00024	0.00056
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L	0.00175	0.00167	0.00168	0.00165	0.00093
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L	0.0399	0.0386	0.0399	0.0393	0.00376
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100 DLA
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000100 DLA
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.020 DLA
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L	0.000195	0.000218	0.000197	0.000207	0.00940
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L	77.5	74.8	74.9	74.4	374
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000338
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00100 DLA
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L	0.00022	0.00022	0.00021	0.00021	0.00361
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L	0.00097	0.00096	0.00097	0.00096	<0.00040 DLA
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L	0.077	0.078	0.075	0.081	<0.020 DLA
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L	0.000348	0.000362	0.000353	0.000403	<0.000100 DLA
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L	0.0046	0.0046	0.0045	0.0044	0.0095
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L	14.5	14.3	14.3	14.0	99.4
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L	0.163	0.156	0.159	0.149	1.33
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050



Analytical Results

Sub-Matrix: Surface Water

Client sample ID

(Matrix: Water)

					KF-DUP	KF-SW-IF	KF-SW-DS-1	KF-SW-DS-2	KF-ADIT-MIDDLE
Client sampling date / time					21-May-2024 00:00	21-May-2024 16:30	21-May-2024 16:15	21-May-2024 15:50	21-May-2024 17:50
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24B1414-001	VA24B1414-002	VA24B1414-003	VA24B1414-004	VA24B1414-005
					Result	Result	Result	Result	Result
Dissolved Metals									
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L	0.000370	0.000383	0.000370	0.000373	0.000687
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L	0.00138	0.00140	0.00136	0.00134	0.0609
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.100 ^{DLA}
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L	0.425	0.404	0.403	0.397	1.96
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L	0.00043	0.00045	0.00045	0.00046	0.00343
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L	0.000554	0.000534	0.000525	0.000481	<0.000100 ^{DLA}
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L	2.66	2.66	2.76	2.63	5.18
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000020 ^{DLA}
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L	1.06	1.05	1.04	1.03	3.81
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L	0.169	0.169	0.168	0.170	0.675
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L	51.5	50.6	52.1	50.5	327
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00040 ^{DLA}
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000020 ^{DLA}
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020 ^{DLA}
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020 ^{DLA}
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00060 ^{DLA}
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020 ^{DLA}
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L	0.00181	0.00180	0.00181	0.00184	0.0306
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00100 ^{DLA}
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L	0.0462	0.0484	0.0473	0.0459	2.56
Zirconium, dissolved	7440-67-7	E421/VA	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00040 ^{DLA}
Dissolved mercury filtration location	----	EP509/VA	-	-	Field	Field	Field	Field	Field
Dissolved metals filtration location	----	EP421/VA	-	-	Field	Field	Field	Field	Field

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

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



Analytical Results

Sub-Matrix: Surface Water

Client sample ID

KF-SW-US-1

(Matrix: Water)

Client sampling date / time

21-May-2024
16:55

Analyte	CAS Number	Method/Lab	LOR	Unit	VA24B1414-006	Result	Result	Result	Result
Physical Tests									
Alkalinity, bicarbonate (as CaCO3)	---	E290/VA	1.0	mg/L	98.5	---	---	---	---
Alkalinity, carbonate (as CaCO3)	---	E290/VA	1.0	mg/L	<1.0	---	---	---	---
Alkalinity, hydroxide (as CaCO3)	---	E290/VA	1.0	mg/L	<1.0	---	---	---	---
Alkalinity, total (as CaCO3)	---	E290/VA	1.0	mg/L	98.5	---	---	---	---
Conductivity	---	E100/VA	2.0	µS/cm	482	---	---	---	---
Hardness (as CaCO3), dissolved	---	EC100/VA	0.60	mg/L	244	---	---	---	---
Hardness (as CaCO3), from total Ca/Mg	---	EC100A/VA	0.60	mg/L	259	---	---	---	---
pH	---	E108/VA	0.10	pH units	8.14	---	---	---	---
Solids, total dissolved [TDS]	---	E162/VA	10	mg/L	367	---	---	---	---
Solids, total suspended [TSS]	---	E160/VA	3.0	mg/L	21.9	---	---	---	---
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	0.0164	---	---	---	---
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L	0.63	---	---	---	---
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	0.0807	---	---	---	---
Nitrate + Nitrite (as N)	---	EC235.N+N/V A	0.0050	mg/L	0.0807	---	---	---	---
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	<0.0010	---	---	---	---
Nitrogen, total	7727-37-9	E366/VA	0.030	mg/L	0.299	---	---	---	---
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L	152	---	---	---	---
Cyanides									
Cyanide, strong acid dissociable (Total)	---	E333/WT	0.0050	mg/L	<0.0050	---	---	---	---
Cyanide, weak acid dissociable	---	E336/WT	0.0050	mg/L	<0.0050	---	---	---	---
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	---	E358-L/CG	0.50	mg/L	8.02	---	---	---	---
Carbon, total organic [TOC]	---	E355-L/VA	0.50	mg/L	7.01	---	---	---	---
Total Sulfides									
Sulfide, total (as S)	18496-25-8	E395/VA	0.0015	mg/L	0.0016	---	---	---	---
Sulfide, total (as H2S)	7783-06-4	E395/VA	0.0016	mg/L	0.0017	---	---	---	---
Total Metals									



Analytical Results

Sub-Matrix: Surface Water

Client sample ID

KF-SW-US-1

(Matrix: Water)

Client sampling date / time

21-May-2024
16:55

Analyte	CAS Number	Method/Lab	LOR	Unit	VA24B1414-006	-----	-----	-----	-----
					Result	---	---	---	---
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	0.247	---	---	---	---
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	0.00032	---	---	---	---
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	0.00415	---	---	---	---
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.0471	---	---	---	---
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L	<0.000100	---	---	---	---
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L	<0.000050	---	---	---	---
Boron, total	7440-42-8	E420/VA	0.010	mg/L	<0.010	---	---	---	---
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L	0.000328	---	---	---	---
Calcium, total	7440-70-2	E420/VA	0.050	mg/L	78.4	---	---	---	---
Cesium, total	7440-46-2	E420/VA	0.000010	mg/L	0.000037	---	---	---	---
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L	<0.00050	---	---	---	---
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L	0.00046	---	---	---	---
Copper, total	7440-50-8	E420/VA	0.00050	mg/L	0.00184	---	---	---	---
Iron, total	7439-89-6	E420/VA	0.010	mg/L	0.762	---	---	---	---
Lead, total	7439-92-1	E420/VA	0.000050	mg/L	0.00350	---	---	---	---
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L	0.0048	---	---	---	---
Magnesium, total	7439-95-4	E420/VA	0.0050	mg/L	15.4	---	---	---	---
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L	0.202	---	---	---	---
Mercury, total	7439-97-6	E508/VA	0.0000050	mg/L	<0.0000050	---	---	---	---
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L	0.000405	---	---	---	---
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L	0.00215	---	---	---	---
Phosphorus, total	7723-14-0	E420/VA	0.050	mg/L	<0.050	---	---	---	---
Potassium, total	7440-09-7	E420/VA	0.050	mg/L	0.455	---	---	---	---
Rubidium, total	7440-17-7	E420/VA	0.00020	mg/L	0.00081	---	---	---	---
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L	0.000546	---	---	---	---
Silicon, total	7440-21-3	E420/VA	0.10	mg/L	3.01	---	---	---	---
Silver, total	7440-22-4	E420/VA	0.000010	mg/L	0.000037	---	---	---	---
Sodium, total	7440-23-5	E420/VA	0.050	mg/L	1.09	---	---	---	---
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L	0.176	---	---	---	---
Sulfur, total	7704-34-9	E420/VA	0.50	mg/L	53.4	---	---	---	---



Analytical Results

Sub-Matrix: Surface Water

Client sample ID

KF-SW-US-1

(Matrix: Water)

Client sampling date / time

21-May-2024
16:55

Analyte	CAS Number	Method/Lab	LOR	Unit	VA24B1414-006				
					Result				
Total Metals									
Tellurium, total	13494-80-9	E420/VA	0.00020	mg/L	<0.00020	---	---	---	---
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L	<0.000010	---	---	---	---
Thorium, total	7440-29-1	E420/VA	0.00010	mg/L	<0.00010	---	---	---	---
Tin, total	7440-31-5	E420/VA	0.00010	mg/L	<0.00010	---	---	---	---
Titanium, total	7440-32-6	E420/VA	0.00030	mg/L	0.00695	---	---	---	---
Tungsten, total	7440-33-7	E420/VA	0.00010	mg/L	<0.00010	---	---	---	---
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L	0.00206	---	---	---	---
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L	0.00088	---	---	---	---
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L	0.0617	---	---	---	---
Zirconium, total	7440-67-7	E420/VA	0.00020	mg/L	<0.00020	---	---	---	---
Dissolved Metals									
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L	0.0087	---	---	---	---
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L	0.00024	---	---	---	---
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L	0.00170	---	---	---	---
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L	0.0382	---	---	---	---
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L	<0.000100	---	---	---	---
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L	<0.000050	---	---	---	---
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L	<0.010	---	---	---	---
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L	0.000183	---	---	---	---
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L	74.5	---	---	---	---
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L	<0.000010	---	---	---	---
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L	<0.00050	---	---	---	---
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L	0.00022	---	---	---	---
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L	0.00093	---	---	---	---
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L	0.078	---	---	---	---
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L	0.000361	---	---	---	---
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L	0.0046	---	---	---	---
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L	14.0	---	---	---	---
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L	0.160	---	---	---	---
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L	<0.0000050	---	---	---	---



Analytical Results

Sub-Matrix: Surface Water
 (Matrix: Water)

					Client sample ID	KF-SW-US-1	----	----	----	----
					Client sampling date / time	21-May-2024 16:55	---	---	---	---
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24B1414-006	-----	-----	-----	-----	
					Result	---	---	---	---	
Dissolved Metals										
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L	0.000406	---	---	---	---	
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L	0.00134	---	---	---	---	
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L	<0.050	---	---	---	---	
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L	0.418	---	---	---	---	
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L	0.00047	---	---	---	---	
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L	0.000472	---	---	---	---	
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L	2.59	---	---	---	---	
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L	<0.000010	---	---	---	---	
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L	1.04	---	---	---	---	
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L	0.168	---	---	---	---	
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L	50.3	---	---	---	---	
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L	<0.00020	---	---	---	---	
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L	<0.000010	---	---	---	---	
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L	<0.00010	---	---	---	---	
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L	<0.00010	---	---	---	---	
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L	<0.00030	---	---	---	---	
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L	<0.00010	---	---	---	---	
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L	0.00181	---	---	---	---	
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L	<0.00050	---	---	---	---	
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L	0.0459	---	---	---	---	
Zirconium, dissolved	7440-67-7	E421/VA	0.00020	mg/L	<0.00020	---	---	---	---	
Dissolved mercury filtration location	----	EP509/VA	-	-	Field	---	---	---	---	
Dissolved metals filtration location	----	EP421/VA	-	-	Field	---	---	---	---	

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

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



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : VA24B1414</p> <p>Client : Government of Yukon</p> <p>Contact : Nicole Novodvorsky</p> <p>Address : Department of Environment, Environmental Protection and Assessment Branch 419 Range Road Whitehorse YT Canada Y1A 3V1</p> <p>Telephone : 867-456-6538</p> <p>Project : Keno Formo Audit</p> <p>PO : ----</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site :</p> <p>Quote number : WR22-GYPT100-002 (Do Not Use, Duplicate, use VA23---002)</p> <p>No. of samples received : 6</p> <p>No. of samples analysed : 6</p>	<p>Page : 1 of 23</p> <p>Laboratory : ALS Environmental - Vancouver</p> <p>Account Manager : Tasnia Tarannum</p> <p>Address : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p>Telephone : +1 604 253 4188</p> <p>Date Samples Received : 22-May-2024 13:02</p> <p>Issue Date : 30-May-2024 17:59</p>
--	---

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.



Analysis Holding Time Compliance

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

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

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

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

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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) KF-ADIT-MIDDLE	E298	21-May-2024	27-May-2024	28 days	6 days	✔	28-May-2024	28 days	7 days	✔	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) KF-SW-DS-1	E298	21-May-2024	27-May-2024	28 days	6 days	✔	28-May-2024	28 days	7 days	✔	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) KF-SW-DS-2	E298	21-May-2024	27-May-2024	28 days	6 days	✔	28-May-2024	28 days	7 days	✔	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) KF-SW-IF	E298	21-May-2024	27-May-2024	28 days	6 days	✔	28-May-2024	28 days	7 days	✔	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) KF-SW-US-1	E298	21-May-2024	27-May-2024	28 days	6 days	✔	28-May-2024	28 days	7 days	✔	
Anions and Nutrients : Ammonia by Fluorescence											
Amber glass total (sulfuric acid) KF-DUP	E298	21-May-2024	27-May-2024	28 days	7 days	✔	28-May-2024	28 days	8 days	✔	
Anions and Nutrients : Chloride in Water by IC											
HDPE KF-ADIT-MIDDLE	E235.Cl	21-May-2024	24-May-2024	28 days	3 days	✔	24-May-2024	28 days	3 days	✔	



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Chloride in Water by IC										
HDPE KF-SW-DS-1	E235.Cl	21-May-2024	24-May-2024	28 days	3 days	✔	24-May-2024	28 days	3 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE KF-SW-DS-2	E235.Cl	21-May-2024	24-May-2024	28 days	3 days	✔	24-May-2024	28 days	3 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE KF-SW-IF	E235.Cl	21-May-2024	24-May-2024	28 days	3 days	✔	24-May-2024	28 days	3 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE KF-SW-US-1	E235.Cl	21-May-2024	24-May-2024	28 days	3 days	✔	24-May-2024	28 days	3 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE KF-DUP	E235.Cl	21-May-2024	24-May-2024	28 days	4 days	✔	24-May-2024	28 days	4 days	✔
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE KF-ADIT-MIDDLE	E235.NO3-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	3 days	✔
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE KF-SW-DS-1	E235.NO3-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	3 days	✔
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE KF-SW-DS-2	E235.NO3-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	3 days	✔
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE KF-SW-IF	E235.NO3-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	3 days	✔



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE KF-SW-US-1	E235.NO3-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	3 days	✔	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE KF-DUP	E235.NO3-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	4 days	✔	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE KF-ADIT-MIDDLE	E235.NO2-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	3 days	✔	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE KF-SW-DS-1	E235.NO2-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	3 days	✔	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE KF-SW-DS-2	E235.NO2-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	3 days	✔	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE KF-SW-IF	E235.NO2-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	3 days	✔	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE KF-SW-US-1	E235.NO2-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	3 days	✔	
Anions and Nutrients : Nitrite in Water by IC (Low Level)											
HDPE KF-DUP	E235.NO2-L	21-May-2024	24-May-2024	3 days	3 days	✔	24-May-2024	3 days	4 days	✔	
Anions and Nutrients : Sulfate in Water by IC											
HDPE KF-ADIT-MIDDLE	E235.SO4	21-May-2024	24-May-2024	28 days	3 days	✔	24-May-2024	28 days	3 days	✔	



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Sulfate in Water by IC										
HDPE KF-SW-DS-1	E235.SO4	21-May-2024	24-May-2024	28 days	3 days	✔	24-May-2024	28 days	3 days	✔
Anions and Nutrients : Sulfate in Water by IC										
HDPE KF-SW-DS-2	E235.SO4	21-May-2024	24-May-2024	28 days	3 days	✔	24-May-2024	28 days	3 days	✔
Anions and Nutrients : Sulfate in Water by IC										
HDPE KF-SW-IF	E235.SO4	21-May-2024	24-May-2024	28 days	3 days	✔	24-May-2024	28 days	3 days	✔
Anions and Nutrients : Sulfate in Water by IC										
HDPE KF-SW-US-1	E235.SO4	21-May-2024	24-May-2024	28 days	3 days	✔	24-May-2024	28 days	3 days	✔
Anions and Nutrients : Sulfate in Water by IC										
HDPE KF-DUP	E235.SO4	21-May-2024	24-May-2024	28 days	4 days	✔	24-May-2024	28 days	4 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) KF-ADIT-MIDDLE	E366	21-May-2024	27-May-2024	28 days	6 days	✔	30-May-2024	28 days	9 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) KF-SW-DS-1	E366	21-May-2024	27-May-2024	28 days	6 days	✔	30-May-2024	28 days	9 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) KF-SW-DS-2	E366	21-May-2024	27-May-2024	28 days	6 days	✔	30-May-2024	28 days	9 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) KF-SW-IF	E366	21-May-2024	27-May-2024	28 days	6 days	✔	30-May-2024	28 days	9 days	✔



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) KF-SW-US-1	E366	21-May-2024	27-May-2024	28 days	6 days	✔	30-May-2024	28 days	9 days	✔
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) KF-DUP	E366	21-May-2024	27-May-2024	28 days	7 days	✔	30-May-2024	28 days	9 days	✔
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide) KF-ADIT-MIDDLE	E333	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide) KF-DUP	E333	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide) KF-SW-DS-1	E333	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide) KF-SW-DS-2	E333	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide) KF-SW-IF	E333	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide) KF-SW-US-1	E333	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔
Cyanides : WAD Cyanide										
UV-inhibited HDPE - total (sodium hydroxide) KF-ADIT-MIDDLE	E336	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Cyanides : WAD Cyanide											
UV-inhibited HDPE - total (sodium hydroxide) KF-DUP	E336	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔	
Cyanides : WAD Cyanide											
UV-inhibited HDPE - total (sodium hydroxide) KF-SW-DS-1	E336	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔	
Cyanides : WAD Cyanide											
UV-inhibited HDPE - total (sodium hydroxide) KF-SW-DS-2	E336	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔	
Cyanides : WAD Cyanide											
UV-inhibited HDPE - total (sodium hydroxide) KF-SW-IF	E336	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔	
Cyanides : WAD Cyanide											
UV-inhibited HDPE - total (sodium hydroxide) KF-SW-US-1	E336	21-May-2024	27-May-2024	14 days	6 days	✔	27-May-2024	14 days	6 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial - dissolved (lab preserved) KF-ADIT-MIDDLE	E509	21-May-2024	29-May-2024	28 days	7 days	✔	29-May-2024	28 days	7 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial - dissolved (lab preserved) KF-SW-DS-1	E509	21-May-2024	29-May-2024	28 days	7 days	✔	29-May-2024	28 days	7 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial - dissolved (lab preserved) KF-SW-DS-2	E509	21-May-2024	29-May-2024	28 days	7 days	✔	29-May-2024	28 days	7 days	✔	
Dissolved Metals : Dissolved Mercury in Water by CVAAS											
Glass vial - dissolved (lab preserved) KF-SW-IF	E509	21-May-2024	29-May-2024	28 days	7 days	✔	29-May-2024	28 days	7 days	✔	



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) KF-SW-US-1	E509	21-May-2024	29-May-2024	28 days	7 days	✔	29-May-2024	28 days	7 days	✔
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) KF-DUP	E509	21-May-2024	29-May-2024	28 days	8 days	✔	29-May-2024	28 days	8 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) KF-ADIT-MIDDLE	E421	21-May-2024	25-May-2024	180 days	4 days	✔	28-May-2024	180 days	7 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) KF-SW-DS-1	E421	21-May-2024	25-May-2024	180 days	4 days	✔	28-May-2024	180 days	7 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) KF-SW-DS-2	E421	21-May-2024	25-May-2024	180 days	4 days	✔	28-May-2024	180 days	7 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) KF-SW-IF	E421	21-May-2024	25-May-2024	180 days	4 days	✔	28-May-2024	180 days	7 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) KF-SW-US-1	E421	21-May-2024	25-May-2024	180 days	4 days	✔	28-May-2024	180 days	7 days	✔
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) KF-DUP	E421	21-May-2024	25-May-2024	180 days	5 days	✔	28-May-2024	180 days	7 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) KF-ADIT-MIDDLE	E358-L	21-May-2024	26-May-2024	28 days	5 days	✔	26-May-2024	28 days	5 days	✔



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) KF-SW-DS-1	E358-L	21-May-2024	26-May-2024	28 days	5 days	✔	26-May-2024	28 days	5 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) KF-SW-DS-2	E358-L	21-May-2024	26-May-2024	28 days	5 days	✔	26-May-2024	28 days	5 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) KF-SW-IF	E358-L	21-May-2024	26-May-2024	28 days	5 days	✔	26-May-2024	28 days	5 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) KF-SW-US-1	E358-L	21-May-2024	26-May-2024	28 days	5 days	✔	26-May-2024	28 days	5 days	✔
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) KF-DUP	E358-L	21-May-2024	26-May-2024	28 days	6 days	✔	26-May-2024	28 days	6 days	✔
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) KF-ADIT-MIDDLE	E355-L	21-May-2024	27-May-2024	28 days	6 days	✔	28-May-2024	28 days	6 days	✔
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) KF-SW-DS-1	E355-L	21-May-2024	27-May-2024	28 days	6 days	✔	28-May-2024	28 days	6 days	✔
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) KF-SW-DS-2	E355-L	21-May-2024	27-May-2024	28 days	6 days	✔	28-May-2024	28 days	6 days	✔
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) KF-SW-IF	E355-L	21-May-2024	27-May-2024	28 days	6 days	✔	28-May-2024	28 days	6 days	✔



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) KF-SW-US-1	E355-L	21-May-2024	27-May-2024	28 days	6 days	✔	28-May-2024	28 days	6 days	✔
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) KF-DUP	E355-L	21-May-2024	27-May-2024	28 days	7 days	✔	28-May-2024	28 days	7 days	✔
Physical Tests : Alkalinity Species by Titration										
HDPE KF-ADIT-MIDDLE	E290	21-May-2024	24-May-2024	14 days	3 days	✔	27-May-2024	14 days	6 days	✔
Physical Tests : Alkalinity Species by Titration										
HDPE KF-SW-DS-1	E290	21-May-2024	24-May-2024	14 days	3 days	✔	27-May-2024	14 days	6 days	✔
Physical Tests : Alkalinity Species by Titration										
HDPE KF-SW-DS-2	E290	21-May-2024	24-May-2024	14 days	3 days	✔	27-May-2024	14 days	6 days	✔
Physical Tests : Alkalinity Species by Titration										
HDPE KF-SW-IF	E290	21-May-2024	24-May-2024	14 days	3 days	✔	27-May-2024	14 days	6 days	✔
Physical Tests : Alkalinity Species by Titration										
HDPE KF-SW-US-1	E290	21-May-2024	24-May-2024	14 days	3 days	✔	27-May-2024	14 days	6 days	✔
Physical Tests : Alkalinity Species by Titration										
HDPE KF-DUP	E290	21-May-2024	24-May-2024	14 days	4 days	✔	27-May-2024	14 days	6 days	✔
Physical Tests : Conductivity in Water										
HDPE KF-ADIT-MIDDLE	E100	21-May-2024	24-May-2024	28 days	3 days	✔	27-May-2024	28 days	6 days	✔



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Conductivity in Water											
HDPE KF-SW-DS-1	E100	21-May-2024	24-May-2024	28 days	3 days	✓	27-May-2024	28 days	6 days	✓	
Physical Tests : Conductivity in Water											
HDPE KF-SW-DS-2	E100	21-May-2024	24-May-2024	28 days	3 days	✓	27-May-2024	28 days	6 days	✓	
Physical Tests : Conductivity in Water											
HDPE KF-SW-IF	E100	21-May-2024	24-May-2024	28 days	3 days	✓	27-May-2024	28 days	6 days	✓	
Physical Tests : Conductivity in Water											
HDPE KF-SW-US-1	E100	21-May-2024	24-May-2024	28 days	3 days	✓	27-May-2024	28 days	6 days	✓	
Physical Tests : Conductivity in Water											
HDPE KF-DUP	E100	21-May-2024	24-May-2024	28 days	4 days	✓	27-May-2024	28 days	6 days	✓	
Physical Tests : pH by Meter											
HDPE KF-SW-DS-1	E108	21-May-2024	24-May-2024	0.25 hrs	69 hrs	* EHTR-FM	27-May-2024	0.25 hrs	134 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE KF-SW-DS-2	E108	21-May-2024	24-May-2024	0.25 hrs	69 hrs	* EHTR-FM	27-May-2024	0.25 hrs	134 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE KF-SW-IF	E108	21-May-2024	24-May-2024	0.25 hrs	69 hrs	* EHTR-FM	27-May-2024	0.25 hrs	134 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE KF-ADIT-MIDDLE	E108	21-May-2024	24-May-2024	0.25 hrs	71 hrs	* EHTR-FM	27-May-2024	0.25 hrs	132 hrs	* EHTR-FM	



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter											
HDPE KF-SW-US-1	E108	21-May-2024	24-May-2024	0.25 hrs	72 hrs	* EHTR-FM	27-May-2024	0.25 hrs	133 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE KF-DUP	E108	21-May-2024	24-May-2024	0.25 hrs	85 hrs	* EHTR-FM	27-May-2024	0.25 hrs	150 hrs	* EHTR-FM	
Physical Tests : TDS by Gravimetry											
HDPE KF-ADIT-MIDDLE	E162	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✓	
Physical Tests : TDS by Gravimetry											
HDPE KF-SW-DS-1	E162	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✓	
Physical Tests : TDS by Gravimetry											
HDPE KF-SW-DS-2	E162	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✓	
Physical Tests : TDS by Gravimetry											
HDPE KF-SW-IF	E162	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✓	
Physical Tests : TDS by Gravimetry											
HDPE KF-SW-US-1	E162	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✓	
Physical Tests : TDS by Gravimetry											
HDPE KF-DUP	E162	21-May-2024	----	----	----		27-May-2024	7 days	7 days	✓	
Physical Tests : TSS by Gravimetry											
HDPE KF-ADIT-MIDDLE	E160	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✓	



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry										
HDPE KF-SW-DS-1	E160	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✔
Physical Tests : TSS by Gravimetry										
HDPE KF-SW-DS-2	E160	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✔
Physical Tests : TSS by Gravimetry										
HDPE KF-SW-IF	E160	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✔
Physical Tests : TSS by Gravimetry										
HDPE KF-SW-US-1	E160	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✔
Physical Tests : TSS by Gravimetry										
HDPE KF-DUP	E160	21-May-2024	----	----	----		27-May-2024	7 days	7 days	✔
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) KF-ADIT-MIDDLE	E508	21-May-2024	28-May-2024	28 days	7 days	✔	28-May-2024	28 days	7 days	✔
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) KF-SW-DS-1	E508	21-May-2024	28-May-2024	28 days	7 days	✔	28-May-2024	28 days	7 days	✔
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) KF-SW-DS-2	E508	21-May-2024	28-May-2024	28 days	7 days	✔	28-May-2024	28 days	7 days	✔
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) KF-SW-IF	E508	21-May-2024	28-May-2024	28 days	7 days	✔	28-May-2024	28 days	7 days	✔



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) KF-SW-US-1	E508	21-May-2024	28-May-2024	28 days	7 days	✔	28-May-2024	28 days	7 days	✔
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) KF-DUP	E508	21-May-2024	28-May-2024	28 days	8 days	✔	28-May-2024	28 days	8 days	✔
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) KF-ADIT-MIDDLE	E420	21-May-2024	25-May-2024	180 days	4 days	✔	28-May-2024	180 days	7 days	✔
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) KF-SW-DS-1	E420	21-May-2024	25-May-2024	180 days	4 days	✔	28-May-2024	180 days	7 days	✔
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) KF-SW-DS-2	E420	21-May-2024	25-May-2024	180 days	4 days	✔	28-May-2024	180 days	7 days	✔
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) KF-SW-IF	E420	21-May-2024	25-May-2024	180 days	4 days	✔	28-May-2024	180 days	7 days	✔
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) KF-SW-US-1	E420	21-May-2024	25-May-2024	180 days	4 days	✔	28-May-2024	180 days	7 days	✔
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) KF-DUP	E420	21-May-2024	25-May-2024	180 days	5 days	✔	28-May-2024	180 days	8 days	✔
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide) KF-ADIT-MIDDLE	E395	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✔



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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide) KF-SW-DS-1	E395	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✔
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide) KF-SW-DS-2	E395	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✔
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide) KF-SW-IF	E395	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✔
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide) KF-SW-US-1	E395	21-May-2024	----	----	----		27-May-2024	7 days	6 days	✔
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide) KF-DUP	E395	21-May-2024	----	----	----		27-May-2024	7 days	7 days	✔

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended
 Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

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

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

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1458005	2	34	5.8	5.0	✔
Ammonia by Fluorescence	E298	1461552	1	16	6.2	5.0	✔
Chloride in Water by IC	E235.Cl	1458008	2	34	5.8	5.0	✔
Conductivity in Water	E100	1458006	2	39	5.1	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1463951	2	40	5.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1458161	1	20	5.0	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1459979	1	20	5.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1458010	2	34	5.8	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1458011	2	24	8.3	5.0	✔
pH by Meter	E108	1458004	2	34	5.8	5.0	✔
Sulfate in Water by IC	E235.SO4	1458012	2	40	5.0	5.0	✔
TDS by Gravimetry	E162	1461535	1	20	5.0	5.0	✔
Total Cyanide	E333	1460467	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1463520	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1458106	1	20	5.0	5.0	✔
Total Nitrogen by Colourimetry	E366	1461553	0	14	0.0	5.0	✖
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1461551	1	13	7.6	5.0	✔
Total Sulfide by Colourimetry (Automated Flow)	E395	1461587	1	20	5.0	5.0	✔
TSS by Gravimetry	E160	1461522	1	20	5.0	5.0	✔
WAD Cyanide	E336	1460468	1	18	5.5	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1458005	2	34	5.8	5.0	✔
Ammonia by Fluorescence	E298	1461552	1	16	6.2	5.0	✔
Chloride in Water by IC	E235.Cl	1458008	2	34	5.8	5.0	✔
Conductivity in Water	E100	1458006	2	39	5.1	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1463951	2	40	5.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1458161	1	20	5.0	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1459979	1	20	5.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1458010	2	34	5.8	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1458011	2	24	8.3	5.0	✔
pH by Meter	E108	1458004	2	34	5.8	5.0	✔
Sulfate in Water by IC	E235.SO4	1458012	2	40	5.0	5.0	✔
TDS by Gravimetry	E162	1461535	1	20	5.0	5.0	✔
Total Cyanide	E333	1460467	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1463520	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1458106	1	20	5.0	5.0	✔



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

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
Total Nitrogen by Colourimetry	E366	1461553	1	14	7.1	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1461551	1	13	7.6	5.0	✔
Total Sulfide by Colourimetry (Automated Flow)	E395	1461587	1	20	5.0	5.0	✔
TSS by Gravimetry	E160	1461522	1	20	5.0	5.0	✔
WAD Cyanide	E336	1460468	1	18	5.5	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1458005	2	34	5.8	5.0	✔
Ammonia by Fluorescence	E298	1461552	1	16	6.2	5.0	✔
Chloride in Water by IC	E235.Cl	1458008	2	34	5.8	5.0	✔
Conductivity in Water	E100	1458006	2	39	5.1	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1463951	2	40	5.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1458161	1	20	5.0	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1459979	1	20	5.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1458010	2	34	5.8	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1458011	2	24	8.3	5.0	✔
Sulfate in Water by IC	E235.SO4	1458012	2	40	5.0	5.0	✔
TDS by Gravimetry	E162	1461535	1	20	5.0	5.0	✔
Total Cyanide	E333	1460467	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1463520	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1458106	1	20	5.0	5.0	✔
Total Nitrogen by Colourimetry	E366	1461553	1	14	7.1	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1461551	1	13	7.6	5.0	✔
Total Sulfide by Colourimetry (Automated Flow)	E395	1461587	1	20	5.0	5.0	✔
TSS by Gravimetry	E160	1461522	1	20	5.0	5.0	✔
WAD Cyanide	E336	1460468	1	18	5.5	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1461552	1	16	6.2	5.0	✔
Chloride in Water by IC	E235.Cl	1458008	2	34	5.8	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1463951	2	40	5.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1458161	1	20	5.0	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1459979	1	20	5.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1458010	2	34	5.8	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1458011	2	24	8.3	5.0	✔
Sulfate in Water by IC	E235.SO4	1458012	2	40	5.0	5.0	✔
Total Cyanide	E333	1460467	1	20	5.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1463520	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1458106	1	20	5.0	5.0	✔
Total Nitrogen by Colourimetry	E366	1461553	1	14	7.1	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1461551	1	13	7.6	5.0	✔



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

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
Matrix Spikes (MS) - Continued							
Total Sulfide by Colourimetry (Automated Flow)	E395	1461587	1	20	5.0	5.0	✔
WAD Cyanide	E336	1460468	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
Conductivity in Water	E100 ALS Environmental - Vancouver	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 ALS Environmental - Vancouver	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.
TDS by Gravimetry	E162 ALS Environmental - Vancouver	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Cyanide	E333 ALS Environmental - Waterloo	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis. Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
WAD Cyanide	E336 ALS Environmental - Waterloo	Water	APHA 4500-CN I (mod)	Weak Acid Dissociable (WAD) cyanide is determined by Continuous Flow Analyzer (CFA) with in-line distillation followed by colourmetric analysis.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO ₂ . NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L ALS Environmental - Calgary	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO ₂ . NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 ALS Environmental - Vancouver	Water	Chinchilla Scientific Nitrate Method, 2011	Following digestion, total nitrogen is determined colourimetrically using a discrete analyzer utilizing the vanadium chloride reduction method. This method of analysis is approved under US EPA 40 CFR Part 136 (May 2021).
Total Sulfide by Colourimetry (Automated Flow)	E395 ALS Environmental - Vancouver	Water	APHA 4500 -S E-Auto-Colorimetry	Sulfide is determined using the gas dialysis automated methylene blue colourimetric method. Results expressed "as H ₂ S" if reported represent the maximum possible H ₂ S concentration based on the total sulfide concentration in the sample. The H ₂ S calculation converts Total Sulphide as (S ₂ ⁻) and reports it as Total Sulphide as (H ₂ S)
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Vancouver	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 ALS Environmental - Vancouver	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO ₃), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Vancouver	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 ALS Environmental - Vancouver	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 ALS Environmental - Calgary	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Total Nitrogen in water	EP366 ALS Environmental - Vancouver	Water	APHA 4500-P J (mod)	Samples for total nitrogen analysis are digested using a heated persulfate digestion. Nitrogen compounds are converted to nitrate in this digestion.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO ₃ .
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: VA24B1414	Page	: 1 of 20
Client	: Government of Yukon	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Novodvorsky	Account Manager	: Tasnia Tarannum
Address	: Department of Environment, Environmental Protection and Assessment Branch 419 Range Road Whitehorse YT Canada Y1A 3V1	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 867-456-6538	Telephone	: +1 604 253 4188
Project	: Keno Formo Audit	Date Samples Received	: 22-May-2024 13:02
PO	: ----	Date Analysis Commenced	: 24-May-2024
C-O-C number	: ----	Issue Date	: 30-May-2024 17:59
Sampler	: ----		
Site	:		
Quote number	: WR22-GYPT100-002 (Do Not Use, Duplicate, use VA23---002)		
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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Ilnaz Badbezanchi	Supervisor - Metals Prep & Mercury	Vancouver Metals, Burnaby, British Columbia
Kelly Fischer	Technical Specialist	Waterloo Inorganics, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Leon Yang	Analyst	Vancouver Inorganics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Analyst	Vancouver Metals, Burnaby, British Columbia



General Comments

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

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

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



Laboratory Duplicate (DUP) Report

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

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1458004)											
VA24B1360-003	Anonymous	pH	----	E108	0.10	pH units	7.92	7.93	0.126%	4%	----
Physical Tests (QC Lot: 1458005)											
VA24B1360-003	Anonymous	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	46.1	46.6	1.08%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	46.1	46.6	1.08%	20%	----
Physical Tests (QC Lot: 1458006)											
VA24B1360-003	Anonymous	Conductivity	----	E100	2.0	µS/cm	367	365	0.546%	10%	----
Physical Tests (QC Lot: 1458248)											
VA24B1620-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	177	176	0.737%	10%	----
Physical Tests (QC Lot: 1458249)											
VA24B1620-001	Anonymous	pH	----	E108	0.10	pH units	7.81	7.80	0.128%	4%	----
Physical Tests (QC Lot: 1458250)											
VA24B1620-001	Anonymous	Alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	44.4	45.3	2.01%	200%	----
		Alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0.00%	200%	----
		Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	44.4	45.3	2.01%	20%	----
Physical Tests (QC Lot: 1461522)											
VA24B1325-003	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	13.1	13.5	0.4	Diff <2x LOR	----
Physical Tests (QC Lot: 1461535)											
VA24B1325-003	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	572	525	8.66%	20%	----
Anions and Nutrients (QC Lot: 1458008)											
VA24B1360-001	Anonymous	Chloride	16887-00-6	E235.Cl	5.00	mg/L	<5.00	<5.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1458010)											
VA24B1360-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0500	mg/L	0.340	0.338	0.0018	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1458011)											
VA24B1360-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1458012)											
VA24B1360-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	3.00	mg/L	954	953	0.159%	20%	----
Anions and Nutrients (QC Lot: 1458252)											



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: 1458252) - continued											
VA24B1405-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	247	246	0.493%	20%	----
Anions and Nutrients (QC Lot: 1458254)											
VA24B1414-005	KF-ADIT-MIDDLE	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0500	mg/L	0.0634	0.0661	0.0027	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1458255)											
VA24B1414-005	KF-ADIT-MIDDLE	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1458257)											
VA24B1414-005	KF-ADIT-MIDDLE	Chloride	16887-00-6	E235.Cl	5.00	mg/L	6.04	6.09	0.04	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1461552)											
VA24B1254-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Cyanides (QC Lot: 1460467)											
TY2405076-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Cyanides (QC Lot: 1460468)											
VA24B1414-001	KF-DUP	Cyanide, weak acid dissociable	----	E336	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1459979)											
VA24B1360-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.64	0.56	0.07	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1461551)											
VA24B1254-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Sulfides (QC Lot: 1461587)											
CG2406732-010	Anonymous	Sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	<0.0015	<0.0015	0	Diff <2x LOR	----
Total Metals (QC Lot: 1458106)											
VA24B1360-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	0.0182	0.0180	1.28%	20%	----
		Barium, total	7440-39-3	E420	0.00050	mg/L	0.00771	0.00730	5.53%	20%	----
		Beryllium, total	7440-41-7	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.000100	mg/L	0.00467	0.00462	0.931%	20%	----
		Calcium, total	7440-70-2	E420	0.250	mg/L	297	294	0.933%	20%	----
		Cesium, total	7440-46-2	E420	0.000050	mg/L	0.00401	0.00394	1.77%	20%	----
		Chromium, total	7440-47-3	E420	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	0.0361	0.0355	1.78%	20%	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	<0.00500	<0.00500	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: 1458106) - continued											
VA24B1360-001	Anonymous	Iron, total	7439-89-6	E420	0.050	mg/L	6.68	6.33	5.42%	20%	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	0.00578	0.00571	1.22%	20%	----
		Lithium, total	7439-93-2	E420	0.0050	mg/L	0.0363	0.0358	0.0005	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.100	mg/L	81.0	77.4	4.52%	20%	----
		Manganese, total	7439-96-5	E420	0.00050	mg/L	18.2	17.6	3.46%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.00125	0.00126	0.00010	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	0.0726	0.0693	4.62%	20%	----
		Phosphorus, total	7723-14-0	E420	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.250	mg/L	3.90	3.81	2.47%	20%	----
		Rubidium, total	7440-17-7	E420	0.00100	mg/L	0.0111	0.0108	2.85%	20%	----
		Selenium, total	7782-49-2	E420	0.00100	mg/L	0.00365	0.00341	0.000234	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.50	mg/L	4.76	4.80	0.04	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.500	mg/L	10.0	10.1	0.345%	20%	----
		Strontium, total	7440-24-6	E420	0.00200	mg/L	0.754	0.756	0.142%	20%	----
		Sulfur, total	7704-34-9	E420	2.50	mg/L	334	334	0.0310%	20%	----
		Tellurium, total	13494-80-9	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000100	mg/L	0.00533	0.00546	2.37%	20%	----
		Vanadium, total	7440-62-2	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0300	mg/L	14.2	13.6	4.20%	20%	----
		Zirconium, total	7440-67-7	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
Total Metals (QC Lot: 1463520)											
KS2401868-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1458161)											
VA24B1414-001	KF-DUP	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0092	0.0091	0.00007	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00024	0.00024	0.000006	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00175	0.00172	2.19%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0399	0.0397	0.336%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 1458161) - continued											
VA24B1414-001	KF-DUP	Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.000195	0.000204	4.44%	20%	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	77.5	77.1	0.556%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00022	0.00023	0.000008	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00097	0.00097	0.000004	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.077	0.079	0.003	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000348	0.000366	0.000018	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0046	0.0046	0.00000010	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	14.5	14.5	0.0386%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.163	0.167	2.76%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000370	0.000396	0.000025	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00138	0.00140	0.00003	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.425	0.443	0.018	Diff <2x LOR	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00043	0.00050	0.00008	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000554	0.000477	15.0%	20%	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.66	2.70	1.38%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	1.06	1.07	1.58%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.169	0.176	4.31%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	51.5	52.8	2.54%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00181	0.00191	5.16%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0462	0.0476	2.90%	20%	----
		Zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 1463951)											
FJ2401414-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1463952)											
VA24B1414-003	KF-SW-DS-1	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----



Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1458005)						
Alkalinity, bicarbonate (as CaCO3)	---	E290	1	mg/L	<1.0	---
Alkalinity, carbonate (as CaCO3)	---	E290	1	mg/L	<1.0	---
Alkalinity, hydroxide (as CaCO3)	---	E290	1	mg/L	<1.0	---
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	<1.0	---
Physical Tests (QCLot: 1458006)						
Conductivity	---	E100	1	µS/cm	<1.0	---
Physical Tests (QCLot: 1458248)						
Conductivity	---	E100	1	µS/cm	1.4	---
Physical Tests (QCLot: 1458250)						
Alkalinity, bicarbonate (as CaCO3)	---	E290	1	mg/L	<1.0	---
Alkalinity, carbonate (as CaCO3)	---	E290	1	mg/L	<1.0	---
Alkalinity, hydroxide (as CaCO3)	---	E290	1	mg/L	<1.0	---
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	<1.0	---
Physical Tests (QCLot: 1461522)						
Solids, total suspended [TSS]	---	E160	3	mg/L	<3.0	---
Physical Tests (QCLot: 1461535)						
Solids, total dissolved [TDS]	---	E162	10	mg/L	<10	---
Anions and Nutrients (QCLot: 1458008)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	---
Anions and Nutrients (QCLot: 1458010)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	---
Anions and Nutrients (QCLot: 1458011)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	---
Anions and Nutrients (QCLot: 1458012)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
Anions and Nutrients (QCLot: 1458252)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
Anions and Nutrients (QCLot: 1458254)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	---
Anions and Nutrients (QCLot: 1458255)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	---
Anions and Nutrients (QCLot: 1458257)						



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 1458257) - continued						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1461552)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1461553)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Cyanides (QCLot: 1460467)						
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	<0.0020	----
Cyanides (QCLot: 1460468)						
Cyanide, weak acid dissociable	----	E336	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 1459979)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 1461551)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Sulfides (QCLot: 1461587)						
Sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	<0.0015	----
Total Metals (QCLot: 1458106)						
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	MBRR
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	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1458106) - continued						
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	---
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	---
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	---
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	---
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	---
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	---
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	---
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	---
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	---
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	---
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	---
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	---
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	---
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	---
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	---
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	---
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	---
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	---
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: 1463520)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	---
Dissolved Metals (QCLot: 1458161)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	---
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	---
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	---
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	---
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	---
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	---
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	---
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	---
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	---
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	---
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	---
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1458161) - continued						
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 1463951)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 1463952)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----



Qualifiers

<i>Qualifier</i>	<i>Description</i>
MBRR	<i>Initial MB for this submission had positive results for flagged analyte (data not shown). Low level samples were repeated with new QC (2nd MB results shown). High level results (>5x initial MB level) and non-detect results were reported and are defensible</i>



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1458004)									
pH	---	E108	---	pH units	7 pH units	100	98.0	102	---
Physical Tests (QCLot: 1458005)									
Alkalinity, total (as CaCO ₃)	---	E290	1	mg/L	500 mg/L	106	85.0	115	---
Physical Tests (QCLot: 1458006)									
Conductivity	---	E100	1	µS/cm	147 µS/cm	98.6	90.0	110	---
Physical Tests (QCLot: 1458248)									
Conductivity	---	E100	1	µS/cm	147 µS/cm	99.3	90.0	110	---
Physical Tests (QCLot: 1458249)									
pH	---	E108	---	pH units	7 pH units	100	98.0	102	---
Physical Tests (QCLot: 1458250)									
Alkalinity, total (as CaCO ₃)	---	E290	1	mg/L	500 mg/L	99.9	85.0	115	---
Physical Tests (QCLot: 1461522)									
Solids, total suspended [TSS]	---	E160	3	mg/L	150 mg/L	107	85.0	115	---
Physical Tests (QCLot: 1461535)									
Solids, total dissolved [TDS]	---	E162	10	mg/L	1000 mg/L	108	85.0	115	---
Anions and Nutrients (QCLot: 1458008)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	98.7	90.0	110	---
Anions and Nutrients (QCLot: 1458010)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.4	90.0	110	---
Anions and Nutrients (QCLot: 1458011)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	---
Anions and Nutrients (QCLot: 1458012)									
Sulfate (as SO ₄)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	99.9	90.0	110	---
Anions and Nutrients (QCLot: 1458252)									
Sulfate (as SO ₄)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	100	90.0	110	---
Anions and Nutrients (QCLot: 1458254)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.5	90.0	110	---
Anions and Nutrients (QCLot: 1458255)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.9	90.0	110	---
Anions and Nutrients (QCLot: 1458257)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.5	90.0	110	---



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1461552)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	99.9	85.0	115	----
Anions and Nutrients (QCLot: 1461553)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	101	75.0	125	----
Cyanides (QCLot: 1460467)									
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	0.25 mg/L	88.6	80.0	120	----
Cyanides (QCLot: 1460468)									
Cyanide, weak acid dissociable	----	E336	0.002	mg/L	0.125 mg/L	96.7	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1459979)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1461551)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	104	80.0	120	----
Total Sulfides (QCLot: 1461587)									
Sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	0.08 mg/L	82.6	80.0	120	----
Total Metals (QCLot: 1458106)									
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	105	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	99.4	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	92.9	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	93.7	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	98.2	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.0	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	102	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	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	98.0	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	92.8	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.0	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	96.9	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1458106) - continued									
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	96.9	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	103	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	96.2	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	104	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	111	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	91.6	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	97.8	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	92.7	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	91.6	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	99.1	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.8	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	96.2	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	100	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	99.7	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: 1463520)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0 mg/L	90.5	80.0	120	----
Dissolved Metals (QCLot: 1458161)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	94.5	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	95.6	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.3	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	95.2	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	91.1	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	92.7	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.0	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	99.6	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.6	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1458161) - continued									
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.5	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.3	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	95.1	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	93.3	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	104	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	96.4	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	93.6	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	96.4	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	96.8	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	95.0	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.1	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	109	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	90.0	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	99.6	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	97.4	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	94.1	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	95.3	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	92.6	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	91.7	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	95.5	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	91.7	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	94.2	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.4	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	96.1	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	92.7	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	95.7	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	96.0	80.0	120	----



Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1458008)										
VA24B1360-002	Anonymous	Chloride	16887-00-6	E235.Cl	1020 mg/L	1000 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1458010)										
VA24B1360-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	25.8 mg/L	25 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1458011)										
VA24B1360-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	5.23 mg/L	5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 1458012)										
VA24B1360-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1010 mg/L	1000 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1458252)										
VA24B1405-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	507 mg/L	500 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1458254)										
VA24B1414-006	KF-SW-US-1	Nitrate (as N)	14797-55-8	E235.NO3-L	2.55 mg/L	2.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1458255)										
VA24B1414-006	KF-SW-US-1	Nitrite (as N)	14797-65-0	E235.NO2-L	0.514 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1458257)										
VA24B1414-006	KF-SW-US-1	Chloride	16887-00-6	E235.Cl	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 1461552)										
VA24B1340-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1461553)										
VA24B1370-001	Anonymous	Nitrogen, total	7727-37-9	E366	0.401 mg/L	0.4 mg/L	100	70.0	130	----
Cyanides (QCLot: 1460467)										
TY2405076-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.210 mg/L	0.25 mg/L	83.9	75.0	125	----
Cyanides (QCLot: 1460468)										
VA24B1414-001	KF-DUP	Cyanide, weak acid dissociable	----	E336	0.120 mg/L	0.125 mg/L	95.9	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1459979)										
VA24B1360-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	4.54 mg/L	5 mg/L	90.7	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1461551)										
VA24B1340-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	5.36 mg/L	5 mg/L	107	70.0	130	----
Total Sulfides (QCLot: 1461587)										
CG2406732-011	Anonymous	Sulfide, total (as S)	18496-25-8	E395	0.196 mg/L	0.2 mg/L	98.0	75.0	125	----
Total Metals (QCLot: 1458106)										



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: 1458106) - continued										
VA24B1360-002	Anonymous	Aluminum, total	7429-90-5	E420	0.180 mg/L	0.2 mg/L	90.2	70.0	130	---
		Antimony, total	7440-36-0	E420	0.0181 mg/L	0.02 mg/L	90.4	70.0	130	---
		Arsenic, total	7440-38-2	E420	0.0213 mg/L	0.02 mg/L	106	70.0	130	---
		Barium, total	7440-39-3	E420	0.0184 mg/L	0.02 mg/L	92.0	70.0	130	---
		Beryllium, total	7440-41-7	E420	0.0375 mg/L	0.04 mg/L	93.7	70.0	130	---
		Bismuth, total	7440-69-9	E420	0.00862 mg/L	0.01 mg/L	86.2	70.0	130	---
		Boron, total	7440-42-8	E420	0.087 mg/L	0.1 mg/L	86.7	70.0	130	---
		Cadmium, total	7440-43-9	E420	0.00367 mg/L	0.004 mg/L	91.8	70.0	130	---
		Calcium, total	7440-70-2	E420	ND mg/L	---	ND	70.0	130	---
		Cesium, total	7440-46-2	E420	0.00963 mg/L	0.01 mg/L	96.3	70.0	130	---
		Chromium, total	7440-47-3	E420	0.0374 mg/L	0.04 mg/L	93.4	70.0	130	---
		Cobalt, total	7440-48-4	E420	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	---
		Copper, total	7440-50-8	E420	0.0181 mg/L	0.02 mg/L	90.4	70.0	130	---
		Iron, total	7439-89-6	E420	1.90 mg/L	2 mg/L	94.9	70.0	130	---
		Lead, total	7439-92-1	E420	0.0174 mg/L	0.02 mg/L	87.2	70.0	130	---
		Lithium, total	7439-93-2	E420	0.0947 mg/L	0.1 mg/L	94.7	70.0	130	---
		Magnesium, total	7439-95-4	E420	ND mg/L	---	ND	70.0	130	---
		Manganese, total	7439-96-5	E420	ND mg/L	---	ND	70.0	130	---
		Molybdenum, total	7439-98-7	E420	0.0182 mg/L	0.02 mg/L	90.9	70.0	130	---
		Nickel, total	7440-02-0	E420	0.0366 mg/L	0.04 mg/L	91.5	70.0	130	---
		Phosphorus, total	7723-14-0	E420	8.94 mg/L	10 mg/L	89.4	70.0	130	---
		Potassium, total	7440-09-7	E420	ND mg/L	---	ND	70.0	130	---
		Rubidium, total	7440-17-7	E420	0.0183 mg/L	0.02 mg/L	91.6	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	9.51 mg/L	10 mg/L	95.1	70.0	130	---
		Silver, total	7440-22-4	E420	0.00341 mg/L	0.004 mg/L	85.4	70.0	130	---
		Sodium, total	7440-23-5	E420	ND mg/L	---	ND	70.0	130	---
		Strontium, total	7440-24-6	E420	ND mg/L	---	ND	70.0	130	---
		Sulfur, total	7704-34-9	E420	ND mg/L	---	ND	70.0	130	---
		Tellurium, total	13494-80-9	E420	0.0380 mg/L	0.04 mg/L	95.0	70.0	130	---
		Thallium, total	7440-28-0	E420	0.00341 mg/L	0.004 mg/L	85.2	70.0	130	---
		Thorium, total	7440-29-1	E420	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	---
		Tin, total	7440-31-5	E420	0.0183 mg/L	0.02 mg/L	91.6	70.0	130	---
		Titanium, total	7440-32-6	E420	0.0366 mg/L	0.04 mg/L	91.5	70.0	130	---
		Tungsten, total	7440-33-7	E420	0.0181 mg/L	0.02 mg/L	90.5	70.0	130	---
		Uranium, total	7440-61-1	E420	0.00386 mg/L	0.004 mg/L	96.6	70.0	130	---
		Vanadium, total	7440-62-2	E420	0.0950 mg/L	0.1 mg/L	95.0	70.0	130	---
		Zinc, total	7440-66-6	E420	0.354 mg/L	0.4 mg/L	88.6	70.0	130	---
		Zirconium, total	7440-67-7	E420	0.0377 mg/L	0.04 mg/L	94.2	70.0	130	---
Total Metals (QCLot: 1463520)										
KS2401868-002	Anonymous	Mercury, total	7439-97-6	E508	0.0000928 mg/L	0 mg/L	92.8	70.0	130	---
Dissolved Metals (QCLot: 1458161)										
VA24B1414-002	KF-SW-IF	Aluminum, dissolved	7429-90-5	E421	0.176 mg/L	0.2 mg/L	87.8	70.0	130	---



Sub-Matrix: Water

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1458161) - continued										
VA24B1414-002	KF-SW-IF	Antimony, dissolved	7440-36-0	E421	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0376 mg/L	0.04 mg/L	93.9	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00883 mg/L	0.01 mg/L	88.3	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.089 mg/L	0.1 mg/L	88.6	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00372 mg/L	0.004 mg/L	93.0	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00987 mg/L	0.01 mg/L	98.7	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0375 mg/L	0.04 mg/L	93.7	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0185 mg/L	0.02 mg/L	92.4	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0178 mg/L	0.02 mg/L	89.3	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.84 mg/L	2 mg/L	92.2	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0178 mg/L	0.02 mg/L	88.8	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0929 mg/L	0.1 mg/L	92.9	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	----	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0363 mg/L	0.04 mg/L	90.7	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	9.29 mg/L	10 mg/L	92.9	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.43 mg/L	4 mg/L	85.8	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0183 mg/L	0.02 mg/L	91.6	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.31 mg/L	10 mg/L	93.1	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00372 mg/L	0.004 mg/L	93.0	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	2.02 mg/L	2 mg/L	101	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	----	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0385 mg/L	0.04 mg/L	96.2	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00351 mg/L	0.004 mg/L	87.7	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.0183 mg/L	0.02 mg/L	91.4	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0351 mg/L	0.04 mg/L	87.8	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0184 mg/L	0.02 mg/L	92.0	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00385 mg/L	0.004 mg/L	96.3	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0956 mg/L	0.1 mg/L	95.6	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.364 mg/L	0.4 mg/L	91.0	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
Dissolved Metals (QCLot: 1463951)										
FJ2401415-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000950 mg/L	0 mg/L	95.0	70.0	130	----
Dissolved Metals (QCLot: 1463952)										
VA24B1414-004	KF-SW-DS-2	Mercury, dissolved	7439-97-6	E509	0.0000972 mg/L	0 mg/L	97.2	70.0	130	----





www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

COC Number 22 -

Page of

Canada Toll Free: 1 800 668 9878

VA24B1414

Report To Contact and company name below will appear on the final report		Reports / Recipients			Turnaround Time (TAT) Requested										AFFIX ALS BARCODE LABEL HERE (ALS use only)			
Company:	Government of Yukon - Dept of ENV / WRB	Select Report Format:	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> EXCEL	<input type="checkbox"/> EDD (DIGITAL)	<input checked="" type="checkbox"/> Routine [R] if received by 3pm M-F - no surcharges apply												
Contact:	Water Resources Branch (V-310)	Merge QC/QCI Reports with COA	<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> N/A	<input type="checkbox"/> 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum												
Phone:	867 332 3120	<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked				<input type="checkbox"/> 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum												
Company address below will appear on the final report		Select Distribution:	<input checked="" type="checkbox"/> EMAIL	<input type="checkbox"/> MAIL	<input type="checkbox"/> FAX	<input type="checkbox"/> 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum												
Street:	419 Range Road	Email 1 or Fax:	cole.fischer@yukon.ca			<input type="checkbox"/> 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum												
City/Province:	Whithorse, Y.T.	Email 2:	nicole.novodvorsky@yukon.ca			<input type="checkbox"/> Same day [E2] if received by 10am M-S - 200% rush surcharge.												
Postal Code:	Y1A 3V1	Email 3:				Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.												
Invoice To:	Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Invoice Recipients			Date and Time Required for all E&P TATs:													
	Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Select Invoice Distribution:	<input checked="" type="checkbox"/> EMAIL	<input type="checkbox"/> MAIL	<input type="checkbox"/> FAX	For all tests with rush TATs requested, please contact your AM to confirm availability.												
Company:		Email 1 or Fax:	cole.fischer@yukon.ca			Analysis Request												
Contact:		Email 2:	nicole.novodvorsky@yukon.ca			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below												
Project Information		Oil and Gas Required Fields (client use)			NUMBER OF CONTAINERS											SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
ALS Account # / Quote #:	GYPT100 / WR22-GYPT100-002	AFE/Cost Center:	PO#			Total/Dissolved metals												
Job #:	Keno Forma Audit	Major/Minor Code:	Routing Code:			Arsenic speciation												
PO / AFE:		Requisitioner:				TOC/DOC												
LSD:		Location:				Chloride												
ALS Lab Work Order # (ALS use only):		ALS Contact:			Sulphate/Sulphide													
		Sampler:	CF, EM, TB, TD		Nitrate, nitrite, total N													
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	PhvCOND/TSS/TDS/Si/Alk/Hardness													
	KF-DUP	24-May-21		SW	Ammonia													
	KF-SW-IF	24-May-21	16:30	SW	Cyanide (WAD/Total)													
	KF-SW-DS-1	24-May-21	16:15	SW														
	KF-SW-DS-2	24-May-21	15:50	SW														
	KF-ADIT-MIDDLE	24-May-21	17:50	SW														
	KF-SW-US-1	24-May-21	16:55	SW														
					SAMPLE RECEIPT DETAILS (ALS use only)													
Drinking Water (DW) Samples ¹ (client use)					Cooling Method: <input type="checkbox"/> NONE <input type="checkbox"/> ICE <input type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input type="checkbox"/> COOLING INITIATED													
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO					Submission Comments identified on Sample Receipt Notification: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO													
Are samples for human consumption use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO					Cooler Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> N/A Sample Custody Seals Intact: <input type="checkbox"/> YES <input type="checkbox"/> NO													
					INITIAL COOLER TEMPERATURES °C						FINAL COOLER TEMP							
SHIPMENT RELEASE (client use)					INITIAL SHIPMENT RECEPTION (ALS use only)					FINAL SHIPMENT RECEPTION (ALS use only)								
Released by:	Cole Fischer	Date:	2022-05-24	Time:	13:30	Received by:	<i>ED</i>	Date:	May 22	Time:	1:34	Received by:		Date:				

Environmental Division
Vancouver
Work Order Reference
VA24B1414



Telephone : +1 604 253 4188

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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

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

VA24B1414

Report To Contact and company name below will appear on the final report		Reports / Recipients		Turnaround Time (TAT) Requested		AFFIX ALS BARCODE LABEL HERE (ALS use only)
Company:	Government of Yukon - Dept of ENV / WRB	Select Report Format:	<input checked="" type="checkbox"/> PDF <input type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)	<input checked="" type="checkbox"/> Routine [R] if received by 3pm M-F - no surcharges apply		
Contact:	Water Resources Branch (V-310)	Merge QC/QCI Reports with COA	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum		
Phone:	867 332 3120	<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		<input type="checkbox"/> 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum		
Company address below will appear on the final report		Select Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX	<input type="checkbox"/> 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum		
Street:	419 Range Road	Email 1 or Fax:	cole.fischer@yukon.ca	<input type="checkbox"/> 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum		
City/Province:	Whithorse, Y.T.	Email 2:	nicole.novodvorsky@yukon.ca	<input type="checkbox"/> Same day [E2] if received by 10am M-S - 200% rush surcharge.		
Postal Code:	Y1A 3V1	Email 3:		Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.		
Invoice To	Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Invoice Recipients		Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm		
	Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Select Invoice Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX	For all tests with rush TATs requested, please contact your AM to confirm availability.		

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	GYPT100 / WR22-GYPT100-002	AFE/Cost Center:	PO#
Job #:	Keno Formo Audit	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact:	Sampler: CF, EM, TB, TD

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), Preserved (P) or Filtered and Preserved (F/P) below												SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
						F/P	Total/Dissolved metals	Arsenic speciation	TOC/DOC	Chloride	Sulphate/Sulphide	Nitrate, nitrite, total N	Ph/COND/TSS/TDS/Alk/Hardness	Ammonia	Cyanide (WAD/Total)					
KF-DUP		24-May-21		SW	9	R	R	R	R	R	R	R	R	R	R	R	R			
KF-SW-IF		24-May-21	16:30	SW	9	R	R	R	R	R	R	R	R	R	R	R	R			
KF-SW-DS-1		24-May-21	16:15	SW	9	R	R	R	R	R	R	R	R	R	R	R	R			
KF-SW-DS-2		24-May-21	15:50	SW	9	R	R	R	R	R	R	R	R	R	R	R	R			
KF-ADIT-MIDDLE		24-May-21	17:50	SW	9	R	R	R	R	R	R	R	R	R	R	R	R			
KF-SW-US-1		24-May-21	16:55	SW	9	R	R	R	R	R	R	R	R	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA24B1414



Telephone : +1 604 253 4188

Drinking Water (DW) Samples¹ (client use)	Mult evaluation by selecting from drop-down below (Excel COC only)		SAMPLE RECEIPT DETAILS (ALS use only)	
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			Cooling Method:	<input type="checkbox"/> NONE <input type="checkbox"/> ICE <input type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input type="checkbox"/> COOLING INITIATED
Are samples for human consumption/ use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			Submission Comments identified on Sample Receipt Notification: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
		Cooler Custody Seals Intact: <input type="checkbox"/> YES <input checked="" type="checkbox"/> N/A		Sample Custody Seals Intact: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
		INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEM

SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (ALS use only)	
Released by:	Cole Fischer	Date:	2022-05-24
Time:	13:30	Received by:	ED
		Date:	MAY 22
		Time:	1:32

Rcvd jc 23May24

1340 ice pk

9°C