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Technical Report Overview

Report: Line Creek Local Aquatic Effects Monitoring Program (LAEMP) Report, 2022

Overview: This report presents the 2022 results of the Local Aquatic Effects Monitoring Program (LAEMP) developed for Teck's Line Creek Operations. The report presents data and evaluation of potential effects of the West Line Creek Active Water Treatment Facility (WLC AWTF) on biological productivity and tissue selenium accumulation downstream of the facility.

This report was prepared for Teck by Minnow Environmental Inc.

For More Information

If you have questions regarding this report, please:

- Phone toll-free to 1.855.806.6854
- Email **feedbackteckcoal@teck.com**

Future studies will be made available at **teck.com/elkvalley.**

Line Creek Local Aquatic Effects Monitoring Program (LAEMP) Report, 2022

Prepared for:
Teck Coal Limited
Sparwood, British Columbia

Prepared by:
Minnow Environmental Inc.
Victoria, British Columbia

April 2023

Line Creek Local Aquatic Effects Monitoring Program (LAEMP) Report, 2022

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EXECUTIVE SUMMARY

The Line Creek Local Aquatic Effects Monitoring Program (LAEMP) was primarily designed to evaluate changes related to the commissioning of the West Line Creek (WLC) Active Water Treatment Facility (AWTF) at the Line Creek Operation (LCO). The WLC AWTF was recommissioned in 2018 with an Advanced Oxidation Process (AOP) due to elevated aqueous concentrations of selenium in AWTF effluent and benthic invertebrates downstream of the AWTF discharge. The AOP is designed to reverse the shift in selenium species in AWTF effluent from chemically-reduced species (which have greater potential for bioaccumulation than selenate) back to a selenate-dominated condition. The WLC AWTF with AOP has been discharging to the receiving environment since December 30, 2018. There are three main foci to the LCO LAEMP in relation to the operation of the WLC AWTF. This report includes Line Creek monitoring data up to the end of the 2022 calendar year to evaluate these three foci that are expressed as the study questions detailed below.

Study Question #1: Is active water treatment affecting biological productivity downstream in Line Creek? This study question relates to the potential for phosphorus concentrations to increase in Line Creek downstream from the WLC AWTF discharge (due to the fluidized bed reactor) and the potential to cause increased algal growth and changes to the trophic status and biotic community structure. Monitoring results indicate that biological productivity in Line Creek did not appear to be influenced by operational activities of the AWTF with AOP. Operation of the AWTF with AOP has minimized concentrations of nutrients (total phosphorus, orthophosphate, and nitrate) to the receiving environment more than operation of the AWTF without AOP. Periphyton coverage and benthic invertebrate biomass and density downstream of the AWTF discharge showed no significant increases during operation of the AWTF with AOP. Benthic invertebrate community endpoints have indicated no consistent adverse changes in community characteristics related to operation of the AWTF with AOP. Rather, temporal stability in taxon richness and an increased percentage of sensitive taxa (Ephemeroptera, Plecoptera and Trichoptera [EPT]) at some areas downstream from the AWTF (i.e., RG_LISP24, RG_LIDSL, RG_LI8 and RG_FO23) during the AWTF with AOP operation compared to AWTF operation without AOP suggests stability in benthic invertebrate community structure at these areas.

Study Question #2: Are tissue selenium concentrations reduced downstream from the WLC AWTF? This study question relates to selenium removal from water within the WLC AWTF via microbial uptake, which decreases total selenium loads to Line Creek, but has the potential to biotransform selenium into reduced and more readily available forms of selenium to biota (i.e., non-selenate forms). Concentrations of non-selenate forms of aqueous selenium and selenium in benthic invertebrate tissues were significantly lower in Line Creek during operation of

the AWTF with AOP compared to without AOP. Mean benthic invertebrate selenium concentrations were below the Level 1 Elk Valley Water Quality Plan (EVWQP; 13 mg/kg) at all areas in 2022 and concentrations of aqueous non-selenate species were generally low and reflective of the low bioaccumulation in benthic invertebrates. Westslope cutthroat trout muscle tissue selenium concentrations were also notably lower during AWTF with AOP compared to operations without AOP. Selenium bioaccumulation in benthic invertebrates and fish from areas downstream of the AWTF discharge have largely been within expectations of the selenium bioaccumulation model during AWTF operation with AOP. Combined, the results from the 2018 to 2022 LCO LAEMPs indicate that the recommissioned AWTF with AOP has functioned as intended to decrease the non-selenate species in AWTF effluent, thereby decreasing the bioavailability of selenium.

Study Question #3: Is WLC AWTF operation affecting aquatic biota through thermal effects, effects on dissolved oxygen concentrations, or concentrations of treatment-related constituents other than nutrients or selenium? This study question relates to other conditions associated with AWTF operation that could potentially adversely influence the receiving environment. Operation of the AWTF with AOP has not resulted in a change in water temperature or dissolved oxygen concentrations in Line Creek downstream of the AWTF relative to areas upstream of the AWTF. Evaluation of water quality analytes demonstrated no increases in analyte concentrations in 2022 that resulted in concentrations above guidelines or water quality benchmarks due to AWTF with AOP operation. Toxicity results during AWTF operation with AOP, and the absence of consistent temporal pattern of responses, or clear evidence of causal factors associated with AWTF with AOP operation for the observed effects, suggest a lack of influence of the AWTF on toxicity.

Overall, operation of the WLC AWTF with AOP has been functioning as designed to remove aqueous total selenium and nitrate from effluent and did not influence the receiving environment through effects to biological productivity, selenium bioaccumulation, or through potential effects related to factors other than nutrients or selenium. Four years of monitoring results during AWTF with AOP operation have consistently shown the AWTF with AOP is functioning as intended, conditions in Line Creek are stable, and the questions of LCO LAEMP have largely been addressed. Teck intends to submit a revised study design that will refine and focus monitoring efforts within the LCO LAEMP now that the study questions have largely been answered. Future monitoring for LCO LAEMP will continue to evaluate conditions of the aquatic receiving environment and the program will be adjusted as mining and water treatment develops at LCO (including adapting future study questions).

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ACRONYMS AND ABBREVIATIONS

AMP – Adaptive Management Plan

ANOVA – Analysis of Variance

AOP – Advanced Oxidation Process

AWTF – Active Water Treatment Facility

BCWQG – British Columbia Water Quality Guideline

BT – Bull trout

CABIN – Canadian Aquatic Biomonitoring Network

CMm – Coal Mountain Mine

DQR – Data Quality Review

EMC – Environmental Monitoring Committee

ENV – British Columbia Ministry of Environment and Climate Change Strategy

EPT – Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies)

EVFFHC – Elk Valley Fish and Fish Habitat Committee

EVO – Elkview Operation

EVWQP – Elk Valley Water Quality Plan

FRO – Fording River Operation

GHO – Greenhills Operation

LAEMP – Local Aquatic Effects Monitoring Program

LCO – Line Creek Operation

LPL – Lowest Practical Level, referring to taxonomic identification of benthic invertebrates

LRL – Laboratory Reporting Limit

RAEMP – Regional Aquatic Effects Monitoring Program

SPO – Site Performance Objective

WCT – Westslope cutthroat trout

WLC – West Line Creek

1 INTRODUCTION

1.1 Background

Teck Coal Limited (Teck) operates four mines in the Elk River watershed to extract steel-making coal. The four mines are the Fording River Operation (FRO), Greenhills Operation (GHO), Line Creek Operation (LCO), and Elkview Operation (EVO; Figure 1.1). A fifth mine, Coal Mountain Mine (CMm), is also owned by Teck and located in the Elk River watershed; however, it is no longer in operation and has been moved into the care and maintenance designation. Discharges from the mines to the Elk River watershed are authorized by the British Columbia Ministry of Environment and Climate Change Strategy (ENV) through permits that are periodically issued under provisions of the *Environmental Management Act*. Permit 107517 specifies the terms and conditions associated with discharges from Teck's Elk Valley mine operations. The Line Creek Local Aquatic Effects Monitoring Program (LAEMP) aims to assess site-specific conditions at LCO relating to potential effects of discharge on the receiving environment from the commissioning of the West Line Creek (WLC) Active Water Treatment Facility (AWTF) by evaluating the potential effects of the AWTF on aquatic health endpoints: water, periphyton, benthic invertebrates, and fish (westslope cutthroat trout [WCT; *Oncorhynchus clarkii lewisii*] and bull trout [BT; *Salvelinus confluentus*]).

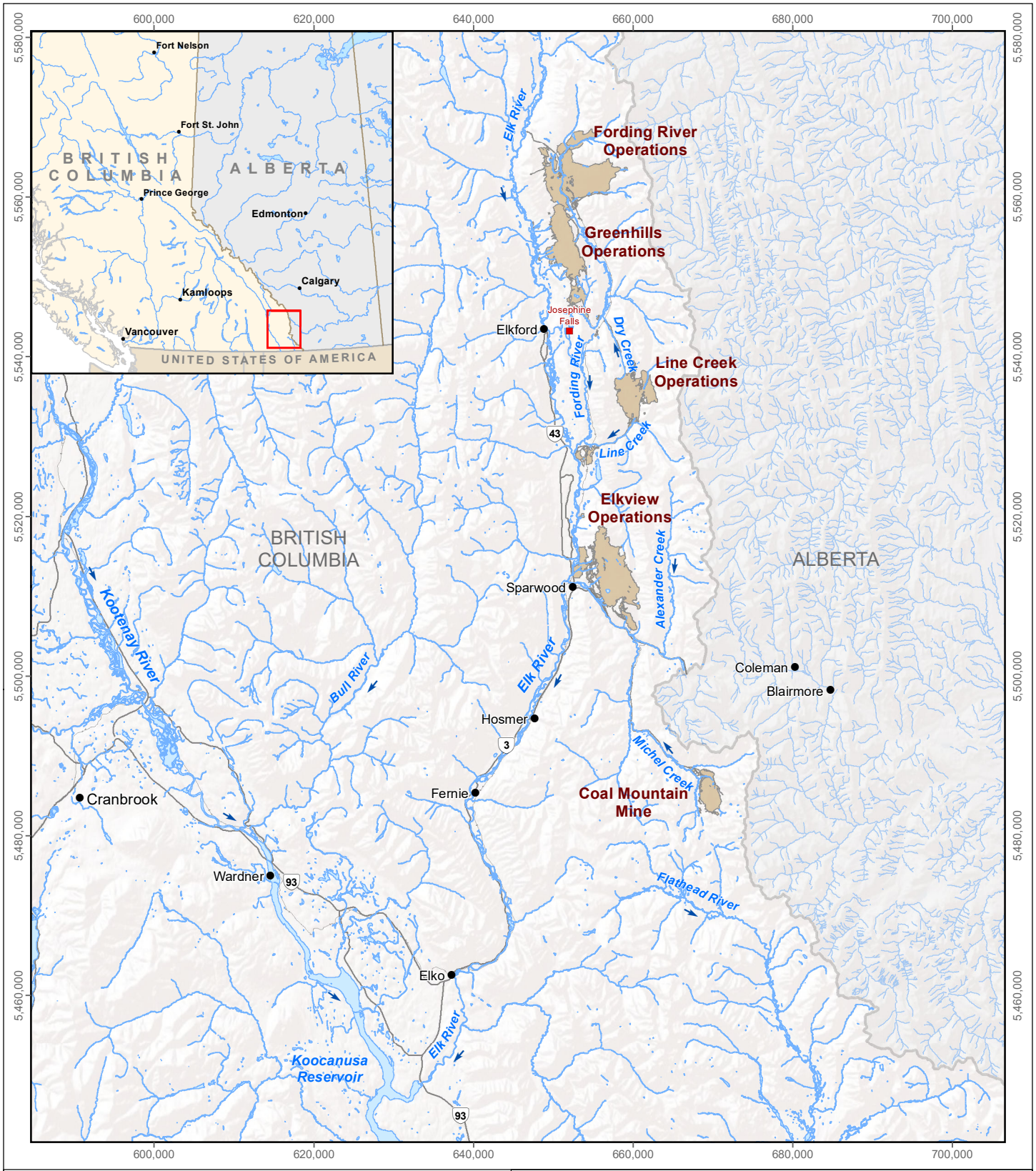
Section 8.3.1.1 of Permit 107517 (version January 27, 2023) outlines the requirements for the Line Creek LAEMP as follows:

> *"The Permittee must develop and implement a Local Aquatic Effects Monitoring program to determine the effects of the Line Creek discharge on the receiving environment. An annual study design for the program must be prepared in consultation with the EMC[1] and submitted to the Director for approval by May 1 each year."*

Also, Section 9.5 of Permit 107517 states:

> *The LAEMP Annual Reports must be reported on in accordance with generally accepted standards of good scientific practice in a written report and submitted to the Director by April 30 of each year following the data collection calendar year.*

[1] EMC refers to the Environmental Monitoring Committee, which Teck was required to form under Permit 107517. The EMC consists of representatives from Teck, BC Ministry of Environment and Climate Change, the Ministry of Energy and Mines, Environment Canada, the Ktunaxa Nation Council, Interior Health Authority, and an independent scientist. Environment Canada has agreed to provide input on a case-by-case basis when requested by the other members of the EMC but has not yet been called upon to participate. The EMC reviews submissions and provides technical advice to Teck and the ENV Director regarding monitoring programs.



LEGEND

Teck Coal Mine Operations

Teck's Coal Mine Operations within the Elk River Watershed, Southeast British Columbia

0 10 20 40 km

Projection: North American Datum 1983 UTM Zone 11 U

N W E S

Date: January 2023
Project 227202.0013

minnow environmental inc.

Figure 1.1

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Teck - 227202.0013 - 2022 LCO LAEMP\D - GIS\Updated Site Maps\22-13 Figure 1.1 Teck Coal Limited Operation.mxd

In addition to monitoring under the LAEMP, Teck's Regional Aquatic Effects Monitoring Program (RAEMP) is a requirement under Permit 107517 and provides comprehensive routine monitoring and assessment of potential mine-related effects on the aquatic environment downstream from Teck's mines in the Elk Valley.

Teck conducts a variety of additional programs to monitor, evaluate, and/or manage the aquatic effects of mining operations within the Elk Valley at local and regional scales, including:

- Water quality monitoring;
- Calcite monitoring;
- Fish and fish habitat management;
- Chronic Toxicity Testing Program;
- Tributary Management Plan; and
- Adaptive Management Plan.

The relevant data from these programs and plans are summarized within the LCO LAEMP report as they relate to conditions in Line Creek and the operation of the AWTF. The goal of the Line Creek LAEMP is to assess site-specific conditions on a more frequent and localized basis than the RAEMP, and the LCO LAEMP approach and study questions may be adapted and adjusted as mining and water treatment plans within LCO develop.

1.2 WLC AWTF Background

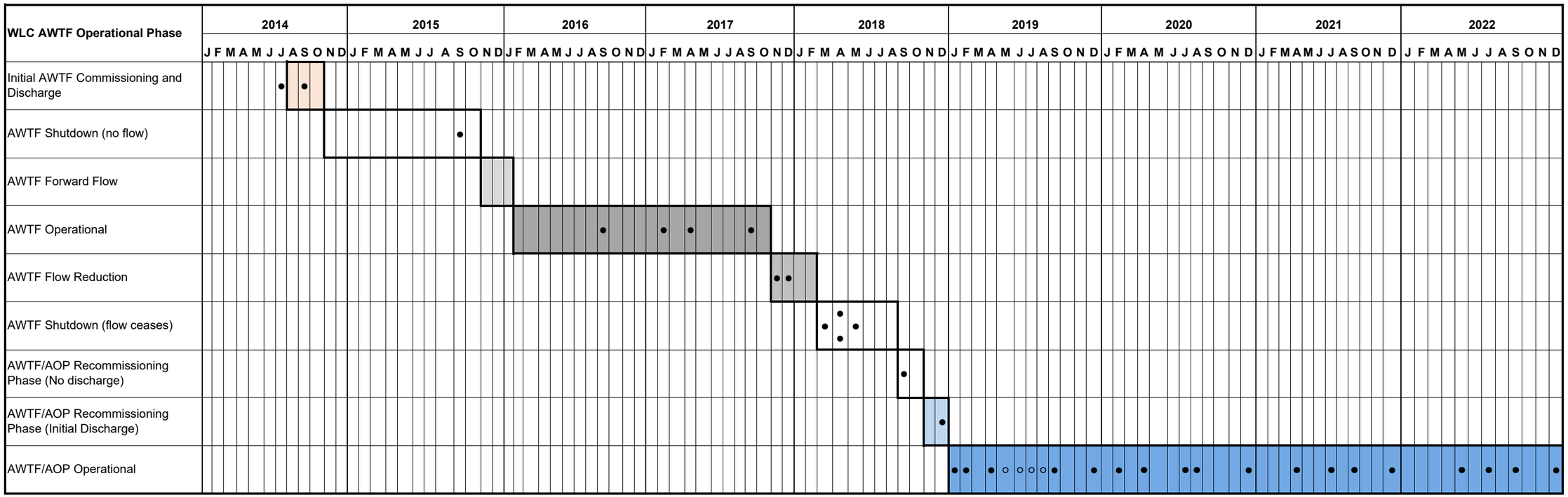
Sampling at Line Creek began in September 2012, as part of the RAEMP, prior to initial commissioning of the WLC AWTF in 2014 (Table 1.1, Figure 1.2). The AWTF operated briefly in 2014 but was shut down due to challenges with the performance of the facility, which included increased concentrations of selenium in benthic invertebrates downstream of the AWTF relative to baseline (2012; Minnow 2015). It was recommissioned in October 2015, with the operational phase commencing in February 2016 (Table 1.1, Figure 1.2). Following this, Teck identified challenges in the performance of the WLC AWTF with respect to selenium treatment whereby aqueous concentrations of chemically-reduced selenium species were elevated in AWTF effluent resulting in the elevation of selenium concentrations in benthic invertebrates downstream of the AWTF discharge relative to historical levels (Minnow 2017a, 2018b). Teck then suspended AWTF operations in response to these results (Table 1.1, Figure 1.2).

Table 1.1: Dates Associated with Phases of WLC AWTF Operation

Phase		Start	End	Approximate Flow (m^3/day)
Initial AWTF Commissioning Phase		24-Jul-14	26-Aug-14	Variable flow
Initial AWTF Discharge		27-Aug-14	16-Oct-14	Variable flow
AWTF Shutdown (no flow)		17-Oct-14	26-Oct-15	0
AWTF Forward Flow During Commissioning		26-Oct-15	31-Jan-16	Variable flow
AWTF Operational		1-Feb-16	14-Oct-17	~5,300 to 5,500
AWTF Flow Reduction		15-Oct-17	8-Mar-18	~2,500
AWTF Intakes Closed, System Dewatered		27-Feb-18	8-Mar-18	Variable flow
AWTF Shutdown (flow ceases)		9-Mar-18	27-Oct-18	0
AWTF/AOP Recommissioning Phase[a]	No Discharge	30-Aug-18	27-Oct-18	0
	Forward Flow (Initial Discharge)	28-Oct-18	29-Dec-18[a]	0 to 5,500
AWTF/AOP Operational		30-Dec-18	Indefinitely	~7,500

Notes: WLC = West Line Creek. AWTF = Active Water Treatment Facility. AOP = Advanced Oxidation Process. The terminology used to describe the AWTF operational phase that began on December 30, 2018 (i.e., following the AWTF/AOP recommissioning phase; August 30, 2018 to December 29, 2018) was updated to more accurately reflect AWTF/AOP operations during this time frame. Terminology in the 2019 LCO LAEMP report identified two AWTF operational phases following AWTF/AOP recommissioning; "AWTF Operational Stabilization" and "AWTF/AOP Steady State Operation" (Minnow 2020a). In the current report, the time period following AWTF/AOP recommissioning (December 30, 2018 to present) has been identified as a termed as a single "AWTF with AOP Operational" phase.

[a] 120 days after recommissioning date.



● = Tissue selenium analysis sampling event included in LAEMP Study Design or in the Approved AWTF Shutdown Plan. Multiple points in one month (i.e., April 2018) indicate multiple sampling events during the month.
○ = Additional tissue selenium analysis sampling event.

AWTF Non-Operational | AWTF Initial Operations | AWTF Forward Flow | AWTF Operational | AWTF Flow Reduction | AWTF with AOP Forward Flow | AWTF with AOP Operational

Figure 1.2: Overview of Completed Benthic Invertebrate Tissue Selenium Sampling Events in Relation to Phases of WLC AWTF Operation, 2014 to 2022

Notes: WLC = West Line Creek; AWTF = Active Water Treatment Facility; AOP = Advanced Oxidation Process; LAEMP = Local Aquatic Effects Monitoring Program. The terminology used to describe the AWTF operational phase that began on December 30, 2018 (i.e., following the AWTF/AOP recommissioning phase; August 30, 2018 to December 29, 2018) was updated to more accurately reflect AWTF/AOP operations during this time frame. Terminology in the 2019 LCO LAEMP report identified two AWTF operational phases following AWTF/AOP recommissioning; "AWTF Operational Stabilization" and "AWTF/AOP Steady State Operation" (Minnow 2020a). In the current report, the time period following AWTF/AOP recommissioning (December 30, 2018 to present) has been identified as a termed as a single "AWTF with AOP Operational" phase.

The AWTF remained shut down until recommissioning with an advanced oxidation process (AOP[2]; August 30, 2018; Table 1.1, Figure 1.2). The AOP is designed to reverse the shift in selenium species in AWTF effluent from chemically-reduced species back to a (chemically-oxidized) selenate-dominated condition thereby decreasing the bioavailability of selenium in Line Creek. Discharge to the receiving environment from the AWTF with AOP began on October 28, 2018, with variable forward flow until December 29, 2018 (Figure 1.2). The AWTF with AOP has been operational since December 30, 2018 ("AWTF with AOP operational phase"; Figure 1.2, Table 1.1).

1.3 Study Questions

Although the broader objective of the Line Creek LAEMP is to assess site-specific conditions at LCO relating to potential effects of discharge on the receiving environment, the LAEMP was designed with the primary focus of monitoring the condition of the aquatic environment and evaluating potential effects related to the commissioning of the WLC AWTF at LCO. The monitoring objectives for the Line Creek LAEMP include three main foci for the assessment of potential adverse effects of WLC AWTF operation to the receiving environment that are expressed as the following study questions:

1. **Is active water treatment affecting biological productivity downstream in Line Creek?** This study question relates to the potential for changes in productivity, trophic status, and biological community structure downstream of the WLC AWTF due to the fluidized bed reactor technology (for selenium and nitrate removal) used at the WLC AWTF which requires the addition of phosphorus to the treatment process. Although the WLC AWTF is managed to minimize the amount of residual phosphorus in treated effluent, there is potential for increased phosphorus concentrations in Line Creek which could potentially cause increased algal growth and changes to trophic status and biological community structure.
2. **Are tissue selenium concentrations reduced downstream from the WLC AWTF?** This study question relates to the potential for a change in the chemical form of selenium released into Line Creek from the WLC AWTF. Selenium in surface waters of the Elk River watershed (including downstream of Teck's mines) is predominantly in the form of selenate, as would be expected in the well-oxygenated, flowing stream habitats that dominate this watershed. At the WLC AWTF, aqueous selenium is removed via uptake into microorganisms within the treatment system where it is transformed to chemically-reduced forms (e.g., selenite and organoselenium species). In aquatic

[2] AOP refers to the advanced oxidation process and associated AWTF process modifications.

receiving environments, some reduced selenium species are accumulated into the base of the food web more readily than selenate (Ogle et al. 1988; Riedel et al. 1996; Stewart et al. 2010; Golder 2021c). As outlined above (Section 1.2), recommissioning of the WLC AWTF with AOP was completed in 2018 to decrease aqueous non-selenate selenium concentrations and thereby the bioavailability of selenium in the receiving environment.

3. **Is WLC AWTF operation affecting aquatic biota through thermal effects, effects on dissolved oxygen concentrations, or concentrations of treatment-related constituents other than nutrients or selenium?** This study question relates to the potential for other conditions related to active water treatment to adversely influence the receiving environment (e.g., an increase in temperature or a decrease in dissolved oxygen concentrations in treated water being released to Line Creek; discharge of treatment-related constituents; or an increase in other aqueous constituents of concern).

1.4 Linkages to Teck's Adaptive Management Plan

As required in Permit 107517 Section 10, Teck developed an Adaptive Management Plan (AMP) to support implementation of the Elk Valley Water Quality Plan (EVWQP) to achieve water quality targets including calcite targets, ensure that human health and the environment are protected, and where necessary, restored, and to facilitate continuous improvement of water quality in the Elk Valley. The AMP was most recently updated in December 2021 (Teck 2021a). Adaptive management is a systematic, rigorous approach to environmental management that maximizes learning about uncertainties while simultaneously striving to meet multiple management objectives and adapt management actions based on what is learned. The adaptive management cycle comprises six stages: assess, design, implement, monitor, evaluate and adjust. The AMP identifies six Management Questions that are re-evaluated at regular intervals. Evaluating these MQs collectively articulates whether Teck is on track to meet the environmental objectives of the EVWQP.

The LCO LAEMP was designed to monitor conditions in Line Creek with the operation of the WLC AWTF. Each annual LAEMP cycle (results are reported on April 30 of each year for the preceding calendar year) are also used for tracking issues for which a potential need for an adjustment, using the response framework, has been identified, including biological trigger assessments. Biological triggers are intended as a simple and consistent way to flag potential unexpected monitoring results that may require additional investigation and adjustment. In the current report, percent EPT (Ephemeroptera [mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]), composite-taxa benthic invertebrate tissue selenium concentrations, and WCT muscle tissue

selenium concentrations in 2022 were assessed against their respective biological triggers (additional information and methods pertaining to this analysis can be found in Appendix F).

Application of the AMP to the LCO LAEMP has occurred in multiple instances, resulting in adjustments to both AWTF operations and to LCO LAEMP monitoring. Some examples of these adjustments are as follows:

- WLC AWTF shut down: Teck temporarily shut down the WLC AWTF after working with regulators to obtain the necessary authorization. The AWTF shut down was in response to elevated tissue selenium concentrations observed in aquatic biota downstream of the AWTF in 2016 and 2017 (Minnow 2017a, 2018b) that was related to elevated concentrations of chemically-reduced forms of aqueous selenium in AWTF effluent. The AWTF was shut down starting on March 9, 2018 (Table 1.1).
- WLC AWTF investigations: Teck completed investigations and pilot-scale trials that indicated that recommissioning the WLC AWTF with an AOP would reverse the shift in selenium species in AWTF effluent from chemically-reduced species back to a selenate-dominated condition.
- WLC AWTF recommissioning: The AWTF was recommissioned with an AOP and resumed operation with the newly-commissioned AOP process approximately eight months initiation of shut down (October 29, 2018). Forward flow through the AWTF with AOP occurred approximately ten months after initiating shut down (on December 29, 2018; Table 1.1).
- Monitoring adjustments: Benthic invertebrate tissue selenium monitoring frequency and timing were adjusted to capture potential changes related to the shutdown and recommissioning of the AWTF with AOP. This included increased monitoring throughout the shutdown period to evaluate conditions while the AWTF was offline (Minnow 2019a), monitoring just prior to and following ATWF with AOP forward flow (with timing adjustments to accommodate changes in the AWTF with AOP implementation schedule; Minnow 2019a, 2020a), and increased monitoring frequency (monthly; May to August 2019) to better understand AWTF with AOP performance during operation stabilization (Minnow 2020a). Adjustments to monitoring timing were also made (in discussion with the EMC) to better reflect spawning events of WCT (i.e., replacing the February sampling event with a July sampling event) and shifting the May sampling event back to April (to further evaluate the elevated benthic invertebrate tissue noted in April 2019; Minnow 2020a).

In addition to addressing questions specific to the LCO LAEMP on an annual basis, aquatic monitoring data from the LAEMP will contribute to the broader data set assessed every three years within the RAEMP. The RAEMP is designed to evaluate MQ 5: “Does monitoring indicate that mine-related changes in aquatic ecosystem conditions are consistent with expectations?” Data from the LAEMP and RAEMP also contribute to answering MQ 2: “Will aquatic ecosystem health be protected by meeting the long-term site performance objectives (SPOs)?”

Results from this report will also be used to determine whether a biological trigger has been reached. Reaching a trigger may lead to an adjustment (Stage 6: Adjust) using the response framework. This is the main report for conveying biological trigger results under the AMP (Section 6). Implementation of management actions is not constrained to the AMP or LAEMP annual reporting cycles but may be (and have been) triggered at any time during the monitoring and reporting cycle.

Identifying and reducing environmental management uncertainty is a foundational aspect of adaptive management. Therefore, the AMP identifies key uncertainties (KUs) that, as reduced, fill gaps in current understanding to support the achievement of the EVWQP objectives. Aquatic monitoring data assist in reducing KU 5.1: “How will monitoring data be used to identify potentially important mine-related effects on the aquatic ecosystem?” and KU 2.1 “How will the science-based benchmarks be validated and updated?” Progress on reducing these KUs, and associated learnings, are described in annual AMP reports.

Aquatic health monitoring results relevant to MQ 5 and KU 5.1 are discussed in Sections 3 to 5 of the present report.

Please refer to the 2021 AMP Update (Teck 2021a) for more information on the adaptive management framework, including Management Questions, key uncertainties, continuous improvement; linkages between the AMP and other EVWQP programs; and AMP reporting. Progress on gaining new knowledge and reducing KUs is described in annual AMP reports (submitted July 31) and evaluating the answers to MQs are reported in MQ evaluation reports (various submission dates).

2 METHODS

2.1 Overview

The Line Creek LAEMP report (see Table 2.1) is structured as an explanation of the collected data and data evaluation in relation to each of the study questions. This report includes data up to the end of the 2022 calendar year for all parameters. Historical data are also presented where appropriate.

Water quality and biological samples were collected from established monitoring areas in Line Creek and the Fording River (Figure 2.1, Table 2.2). These monitoring areas represent the same locations that have been sampled for the LCO LAEMP since 2014 (Minnow 2015) with the addition of RG_LCUT (LC_LCUSWLC) in 2016 (Minnow 2017a), and RG_LISP24 (WL_DCP_SP24) and RG_LIDCOM (LC_LCC) in 2017 (Minnow 2018b). Sampling includes areas both upstream and downstream of the AWTF discharge in Line Creek, as well as associated reference areas (RG_LI24 and RG_SLINE). Specifically, RG_LCUT is situated upstream from the AWTF discharge and mainly reflects water quality influences farther upstream on the main stem of Line Creek (LC_LCUSWLC) when the AWTF is operating. When WLC flows are not being diverted to the AWTF for treatment (i.e., during reduction of effluent flow through the AWTF or during AWTF shutdown) water quality at RG_LCUT also reflects input from WLC. The monitoring areas RG_LILC3, RG_LISP24, RG_LIDSL, RG_LIDCOM, and RG_LI8 are downstream from the WLC AWTF, providing spatial resolution of the potential influence of the AWTF treatment in Line Creek. Monitoring areas RG_FRUL and RG_FO23 are situated off the mine site, in the Fording River upstream and downstream of the Line Creek confluence, respectively (Figure 2.1, Table 2.2). Continuous water temperature is also monitored at six locations (Figure 2.2, Table 2.3).

The methods associated with sample collection, laboratory analysis, and data analyses are described in the following sections and in Appendix A.

2.2 Water Quality

2.2.1 Routine Water Quality

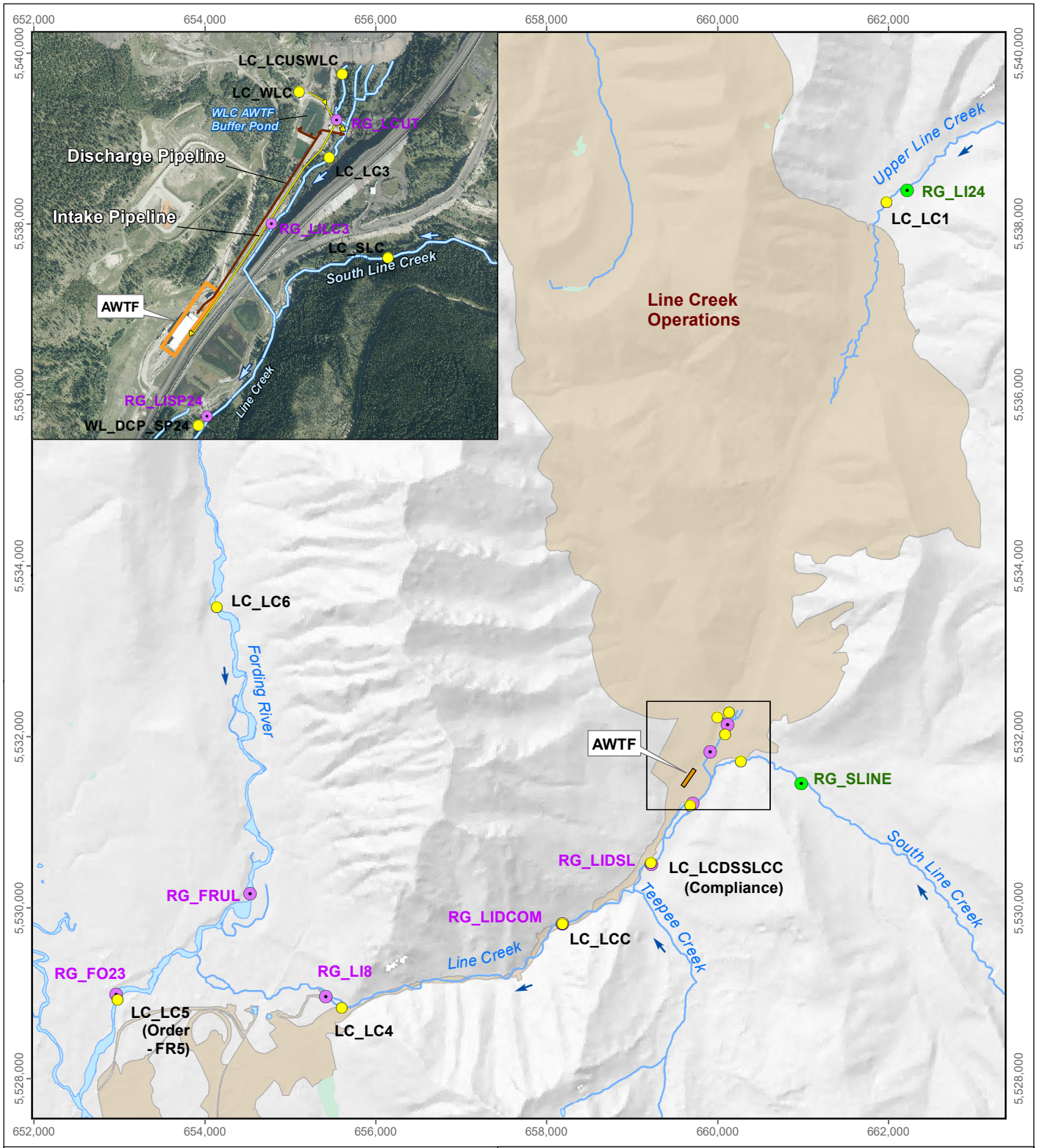
Water quality data assessed as part of the LCO LAEMP included data for routine monitoring managed by Teck (Table 2.4), and water samples collected at the biological monitoring stations concurrently with biological sampling (Figure 2.1, Table 2.2). Routine water quality results were paired with the closest biological monitoring station (Table 2.2). The biological monitoring area RG_LCUT is situated upstream from the AWTF and mainly reflects water quality influences farther upstream on the main stem of Line Creek (LC_LCUSWLC) when the AWTF is operating, but also

Table 2.1: General Approach for the 2022 Line Creek LAEMP as Presented in the LAEMP Study Design (Minnow 2021b)

Key Questions	Assessment Endpoints	Measurement Endpoints				How Data will be Evaluated to Address Key Question[a]
		Water	Sampling Areas	Biological	Sampling Areas	
Is active water treatment affecting biological productivity downstream in Line Creek?	Biological productivity downstream from the AWTF discharge post- compared to pre-AWTF commissioning, among AWTF operational phases, and relative to productivity observed upstream from the discharge	Nutrient concentrations	LC_LC1, LC_SLC, LC_WLC, LC_LCUSWLC, LC_LC3, WL_DCP_SP24, LC_LCDSSLCC, LC_LCC, LC_LC4, LC_LC6, LC_LC5 (see Table 2.4 for timing)	Periphyton coverage, Benthic invertebrate biomass, Benthic invertebrate community structure	Benthic Invertebrate Biomass - RG_LI24, RG_SLINE, RG_LILC3, RG_LIDSL Periphyton coverage and Benthic Invertebrate Community - RG_LI24, RG_SLINE, RG_LCUT, RG_LILC3, RG_LISP24, RG_LIDSL, RG_LIDCOM, RG_LI8, RG_FRUL, RG_FO23	Determine if there is an increase in periphyton coverage, benthic invertebrate biomass, or shift in community structure that has been demonstrated to correspond with changes in AWTF operational status and changes in parameters associated with productivity (e.g., nutrient concentrations)
Are tissue selenium concentrations reduced downstream from the AWTF?	Tissue selenium concentrations downstream from the AWTF discharge post- compared to pre-AWTF commissioning, among AWTF operational phases, and relative to concentrations observed upstream from the discharge	Total and dissolved selenium concentrations	LC_LC1, LC_SLC, LC_WLC, LC_LCUSWLC, LC_LC3, WL_DCP_SP24, LC_LCDSSLCC, LC_LCC, LC_LC4, LC_LC6, LC_LC5 (see Table 2.4 for timing)	Benthic invertebrate tissue selenium (composite-taxa samples)	RG_LI24, RG_SLINE, RG_LCUT, RG_LILC3, RG_LISP24, RG_LIDSL, RG_LIDCOM, RG_LI8, RG_FRUL, RG_FO23	Determine if there is a change in benthic invertebrate tissue selenium concentrations over time that corresponds to changes in total selenium concentrations or selenium speciation in water. Benthic invertebrate community data being collected for other purposes can be used as supporting evidence of ecosystem health status downstream from the AWTF
		Selenium speciation	LC_LC1, LC_SLC, LC_WLC, LC_LCUSWLC, LC_LC3, WL_DCP_SP24, LC_LCDSSLCC, LC_LCC, LC_LC4, LC_LC6, LC_LC5 (see Table 2.4 for timing)			
Is AWTF operation affecting aquatic biota through thermal effects, effects on dissolved oxygen concentrations or concentrations of treatment-related constituents other than nutrients or selenium?	Biological community structure downstream from the AWTF discharge post- compared to pre-AWTF commissioning, among AWTF operational phases, and relative to community structure observed upstream from the discharge	Temperature (data loggers)	5 locations in the effluent mixing zone, and 1 location upstream of the AWTF discharge (see Figure 2.2 and Table 2.3)	Benthic invertebrate community structure	RG_LI24, RG_SLINE, RG_LCUT, RG_LILC3, RG_LISP24, RG_LIDSL, RG_LIDCOM, RG_LI8, RG_FRUL, RG_FO23 (annually)	Temperatures that are above/below the guideline, and dissolved oxygen concentrations that are above the threshold for effects to fish outside of the initial mixing zone, and confirmation that the mixing zone is small, will be indicative of effective management of treated water discharge. Benthic invertebrate community data being collected for other purposes can be used as supporting evidence of ecosystem health status downstream from the AWTF
		Dissolved oxygen	LC_LC1, LC_SLC, LC_WLC, LC_LCUSWLC, LC_LC3, WL_DCP_SP24, LC_LCDSSLCC, LC_LCC, LC_LC4, LC_LC6, LC_LC5 (see Table 2.4 for timing)			
		Toxicity	LC_SLC, WL_BFWB_OUT_SP21, LC_LC3 LC_LCDSSLCC, LC_LC5 (see Table 2.4 for timing)			Determine if there is a change in benthic invertebrate community endpoints away from the reference condition that does not correspond to observed changes in nutrients or selenium concentrations

Notes: LAEMP = Local Aquatic Effects Monitoring Program. AWTF = Active Water Treatment Facility.

[a] Data evaluation approach presented differs slightly from the evaluation criteria in Table 2.1 of the study design. The data evaluation approach displayed herein is integrated for water and biological endpoints, and these were presented separately in the study design.



LEGEND

- Teck Water Quality Station
- Mine-exposed Biological Sampling Area
- Reference Biological Sampling Area
- Active Water Treatment Facility (AWTF) with Advanced Oxidation Process (AOP)
- Teck Coal Mine Operations

Line Creek LAEMP Biological Monitoring Areas and Teck Water Quality Stations, 2022

0 1 2 4 km

Map Projection: UTM Zone 11 U NAD 1983

N W E S

Date: January 2023
Project 227202.0013

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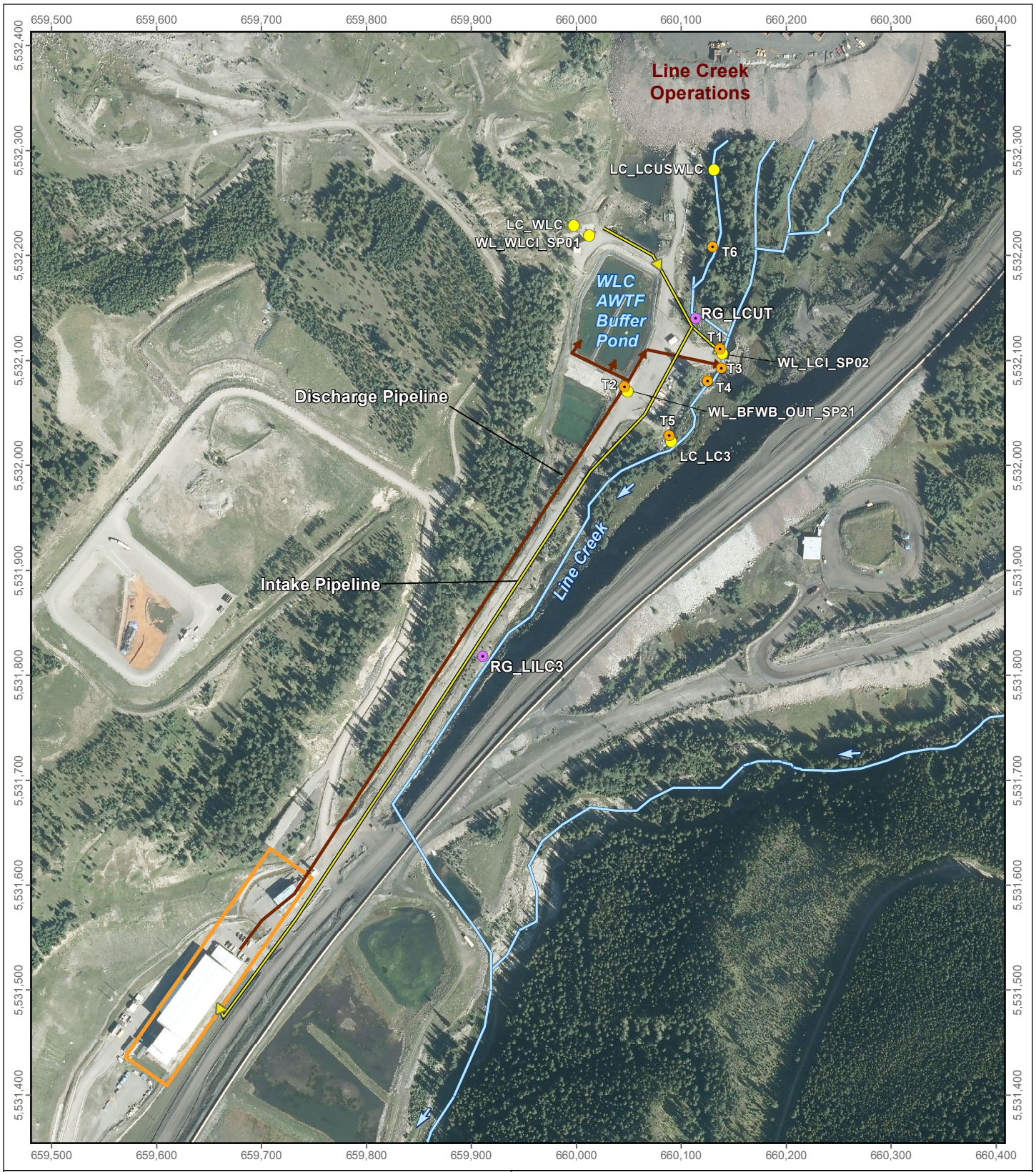
Figure 2.1

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Teck - 227202.0013 - 2022 LCO LAEMP\D - GIS\Updated Site Maps\22-13 Figure 2.1 LC LAEMP Bio Monitoring Areas and Teck WQ Stations.mxd

Table 2.2: Monitoring Areas Associated with Line Creek LAEMP, 2022

Area	Water Quality Sampling Station					Biological Sampling			
	Teck Location Code	EMS Number	Location Description	UTM (11U)		Station ID	Location Description	UTM (11U)	
				Easting	Northing			Easting	Northing
Reference	LC_LC1	E216142	Line Creek upstream of LCO and MSA North Pit	661979	5538254	RG_LI24	South fork of upper Line Creek	662214	5538393
	LC_SLC	E282149	South Line Creek west side of Main Rock Drain, upstream of Line Creek	660271	5531737	RG_SLINE	South Line Creek upstream of Line Creek and LCO	661122	5531374
Mine-exposed Line Creek	LC_LCUSWLC	E293369	Line Creek downstream of rock drain, upstream of West Line Creek and AWTF outfall	660114	5532140	RG_LCUT	Line Creek downstream of rock drain, downstream of West Line Creek and upstream of AWTF outfall	660114	5532140
	LC_LC3	0200337	Line Creek downstream of West Line Creek and AWTF outfall	660090	5532023	RG_LILC3	Line Creek downstream of West Line Creek and AWTF outfall	659911	5531818
	WL_DCP_SP24	N/A	Line Creek downstream of LC_WTF_OUT, approximately 50 m downstream of contingency pond discharge	659684	5531191	RG_LISP24	Line Creek downstream of LC_WTF_OUT, approximately 50 m downstream of contingency pond discharge	659674	5531168
	LC_LCDSSLCC (compliance)	E297110	Line Creek immediately downstream of South Line Creek confluence	659218	5530522	RG_LIDSL	Line Creek downstream of South Line Creek confluence	659294	5530583
	LC_LCC	N/A	Line Creek downstream of the compliance point	658185	5529820	RG_LIDCOM	Line Creek downstream of the compliance point	658184	5529814
	LC_LC4	020044	Line Creek canyon, upstream of Process Plant	655604	5528824	RG_LI8	Line Creek downstream of the canyon	655426	5528959
Mine-exposed Fording River	LC_LC6	0200338	Fording River downstream of Grace Creek, upstream of Line Creek	654140	5533513	RG_FRUL	Fording River downstream of Grace Creek, upstream of Line Creek	654530	5530162
	LC_LC5 (Order - FR5)	0200028	Fording River downstream of Line Creek	652977	5528919	RG_FO23	Fording River downstream of Line Creek	652808	5528334

Notes: UTM = Universal Transverse Mercator. LCO = Line Creek Operation. AWTF = Active Water Treatment Facility.



LEGEND

- Temperature Data Logger
- Biological Monitoring Area
- Teck Water Quality Station
- Active Water Treatment Facility (AWTF) with Advanced Oxidation Process (AOP)

Line Creek LAEMP Monitoring Areas and Teck Water Quality Stations in Upper Line Creek, 2022

0 85 170 340 Meters

Projection: North American Datum 1983 UTM Zone 11 U

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Date: January 2023
Project 227202.0013

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Figure 2.2

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Teck - 227202.0013 - 2022 LCO LAEMP\D - GIS\Updated Site Maps\22-13 Figure 2.2 Line Creek LAEMP Monitoring Areas and Teck WQ in Upper Line CK.mxd

Table 2.3: Temperature Data Logger Locations, 2022

Logger ID	Location Description	UTM (NAD83, 11U)	
		Easting	Northing
T1	Temperature upstream of LC Intake	660137	5532111
T2	Temperature of Buffer Pond outlet box	660046	5532074
T3	Temperature in V-Notch Discharge	660140	5532096
T4	Temperature 5 m downstream of discharge	660130	5532076
T5	Temperature at LC3 (100 m DS of outfall)	660092	5532030
T6	Temperature at LCUT (upstream of LC Intake and T1 data logger)	660126	5532192

Notes: UTM = Universal Transverse Mercator. LC = Line Creek. Logger T6 failed to record data from December 2021 onward, until it was checked during retrieval in September 2022. The logger was reset concurrently with a second logger to reduce the chance of data loss next year.

Table 2.4: Summary of Water Quality Monitoring for Permit 107517

Location Description	Teck Water Station Code (associated Biological Station Code in brackets)	EMS Number	UTM (NAD83, 11U)		Water Quality Samples				
			Easting	Northing	Area Type	Field Parameters[a]	All Other Parameters Required Under Mine Permits[b]	Toxicity[e] Acute[f]	Toxicity[e] Chronic[g]
Line Creek upstream of LCO	LC_LC1 (RG_LI24)	E216142	661979	5538254	Reference	M	M	-	-
South Line Creek	LC_SLC (RG_SLINE)	E282149	660271	5531737	Reference	M	M	-	Q/SA
Line Creek upstream of WLC AWTF	LC_LCUSWLC (RG_LCUT)	E293369	660114	5532140	Mine-exposed	M	M	-	-
West Line Creek (WLC)	LC_WLC (RG_LCUT)	E261958	5532227	659998	Mine-exposed	M	M	-	-
Line Creek AWTF Influent	WL_LCI_SP02	E293370	660138	5532109	Mine-exposed	D	M	-	-
West Line Creek AWTF Influent	WL_WLCI_SP01	E293371	660011	5532218	Mine-exposed	D	M	-	-
AWTF Effluent (buffer pond discharge)	WL_BFWB_OUT_SP21	E291569	660050	5532070	Mine-exposed	D	M[c]	Q	-
Line Creek ~200 m downstream of the WLC AWTF	LC_LC3 (RG_LILC3)	0200337	660090	5532023	Mine-exposed	W/M	W/M[h]	-	Q/SA
Line Creek	WL_DCP_SP24 (RG_LISP24)	-	659684	5531191	Mine-exposed	S	S	-	-
Line Creek downstream South Line Creek Confluence	LC_LCDSSLCC (RG_LIDSL)	E297110	659218	5530522	Mine-exposed	W/M	W/M[d,h]	-	Q/SA
Line Creek downstream of compliance	LC_LCC (RG_LIDCOM)	-	658185	5529820	Mine-exposed	S	S	-	-
Line Creek upstream of the process plant and ~5,550 m downstream of the WLC AWTF	LC_LC4 (RG_LI8)	0200044	655604	5528824	Mine-exposed	W/M	W/M[i]	-	-
Fording River upstream Line Creek	LC_LC6 (RG_FRUL)	0200338	654140	5533513	Mine-exposed	S	S	-	-
Fording River downstream Line Creek	LC_LC5 (RG_FO23)	0200028	652977	5528919	Mine-exposed	W/M	W/M	-	Q/SA

Notes: "-" = Sampling will not be completed at this area; UTM = Universal Transverse Mercator; LCO = Line Creek Operations; AWTF = Active Water Treatment Facility; D = daily; T = twice monthly; M = monthly; W = weekly; W/M = weekly during freshet (March 15 to July 15); Q = quarterly; S = September (once). September sampling at WL_DCP_SP24, LC_LCC, and LC_LC6 is not included in Permit 107517. Sampling frequency is currently managed through the permit, and after one year of data collection during sustained operation of the AWTF with AOP sampling frequency may be adjusted.

[a] Dissolved oxygen, water temperature, specific conductance, pH (see Table 2.5).

[b] Parameters consistent with Permit 107517 (see Table 2.5 for details).

[c] Three times weekly for total selenium and 5-day Biochemical Oxygen Demand. Selenium speciation, sulphide, bromate, hydrogen peroxide, and ozone measured at frequency shown (in addition to parameters listed in footnote b).

[d] Total phosphorus every two weeks from June 15th to September 30th.

[e] Acute and chronic as per Permit 107517 requirements.

[f] Q = Quarterly 96-hr rainbow trout LC_{50}; 48-hr *Daphnia* spp. LC_{50}.

[g] Q = Quarterly 7-day *C. dubia* growth and survival, 72-hr *P. subcapitata* growth tests; SA = Semi-annual 28-day *H. azteca* growth and survival tests in spring and fall, 30-day early life stage rainbow trout tests in spring and fall, 30-day early life stage fathead minnow tests in summer and winter.

[h] 5-day Biochemical Oxygen Demand, sulfide, bromate, hydrogen peroxide measured at frequency shown (in addition to parameters listed in footnote b).

[i] Bromate and hydrogen peroxide measured at frequency shown (in addition to parameters listed in footnote b).

reflects input from West Line Creek (LC_WLC) when the AWTF is not operational (and flows are not being diverted to the AWTF for treatment; see Section 2.1). Accordingly, water quality data for RG_LCUT in 2022 (similar to 2019 to 2021) were associated with routine water quality monitoring data from LC_LCUSWLC for data analysis because the AWTF was operational throughout the year (Figure 1.2; Appendix Sections A1.1 to A1.4)[3].

2.2.1.1 Laboratory and Data Analysis

Water samples were analyzed by ALS Environmental, Calgary, Alberta, for constituents consistent with Permit 107517 (i.e., conventional parameters, major ions, nutrients, and total and dissolved metals) using standard methods (see Appendix A1.3).

Water samples were analyzed by Brooks Applied Labs, Seattle, Washington for selenium speciation analysis (including concentrations of selenate, selenite, DMSeO, MeSe(IV), methaneselenonic acid, selenocyanate, selenomethionine, selenosulphate, and unknown selenium species).

Water quality data were downloaded from Teck's EQuIS database and included both routine monitoring results collected by Teck and samples collected concurrently with biological sampling. Temperature data was recorded continuously at locations immediately upstream and downstream of the AWTF discharge (using data loggers; Figure 2.2, Table 2.3). Analyses of water quality data were completed using the following approaches (see Appendix A1.4 for detailed methodology):

- Tabular and graphical comparison to applicable benchmarks, concentration effects limits, updated effects concentrations, SPOs, and British Columbia Water Quality Guidelines (BCWQGs);
- Comparison of the ratio of the monthly mean total phosphorus and orthophosphate concentrations to the monthly mean baseline concentrations during the pre-AWTF operation period (97.5th percentile);
- Graphical comparison of temperature and dissolved oxygen concentrations relative to BCWQG; and
- Graphical comparison of temperatures upstream and downstream of the AWTF discharge relative to temperature measurements recorded further upstream at LC_LCUSWLC (recorded using data loggers).

[3] The AWTF was shut down for periods of over 24 hours on three occasions in 2022. The AWTF was shut down for annual maintenance on June 7, July 26 and August 30, 2022 (Teck 2023a). As the duration of these events were short, water quality data for RG_LCUT from the brief shut down periods were reported in relation to those from LC_LCUSWLC for data interpretation.

2.2.2 Toxicity Testing

Effluent samples from the WLC AWTF (WL_BFWB_OUT_SP21) were collected for acute toxicity testing on a quarterly basis, as stipulated in Permit 107517 (Table 2.4). The acute toxicity tests were conducted using *Oncorhynchus mykiss* and *Daphnia* spp. (detailed methodology can be found in Appendix A2).

Chronic toxicity tests were also completed on water samples collected quarterly and semiannually in 2022 at two mine-exposed areas of Line Creek (Compliance Point [LC_LCDSSLCC] and LC_LC3) and at one mine-exposed area of the Fording River[4] (LC_LC5; Figure 2.1, Table 2.4), as per the Permit 107517. The quarterly and semi-annual tests were conducted using *Pseudokirchneriella subcapitata, Ceriodaphnia dubia, Hyalella azteca*, *Oncorhynchus mykiss,* and *Pimephales promelas* (detailed methodology can be found in Appendix A3). Chronic toxicity tests were also completed on water samples from one reference area (LC_SLC) in 2022 as a within-watershed reference location for Line Creek. Water quality samples were collected during toxicity testing to support evaluation of toxicity results (see Appendix A3 for detailed methods). See Teck 2023a and WSP 2023 for details on acute and chronic toxicity testing, respectively.

2.2.3 EVWQP benchmarks and Updated Effects Concentrations

Preparation of the 2014 Elk Valley Water Quality Plan (EVWQP) required derivation of science-based benchmarks for nitrate, sulphate, cadmium, and selenium. Risks associated with these constituents depend on their concentrations, concentrations of other water chemistry parameters known as exposure and toxicity modifying factors (ETMFs), and the sensitivity of aquatic receptors that could be exposed. The EVWQP benchmarks were derived, using a large body of published and site-specific information available at that time, to represent scientific best estimates of concentrations associated with no effects and defined levels of potential effect on chronic, sublethal endpoints for sensitive aquatic species. Margins of safety were incorporated in benchmark derivation to account for uncertainty and Teck committed to undertaking further study and periodic updates to progressively reduce that uncertainty and improve confidence in the benchmarks.

Studies conducted to progressively reduce uncertainty in benchmarks have included additional chronic toxicity studies of nitrate, sulphate, cadmium, and selenium individually and in mixtures, annual evaluation of water quality under the regional chronic toxicity monitoring program, updates to selenium bioaccumulation models in 2017 and 2022, development of new tools to predict

[4] Interpretation of chronic toxicity results in the present report was specifically focused on applicable results for monitoring stations located in Line Creek associated with the LCO LAEMP (i.e., excluding Fording River [LC_LC5] results).

bioaccumulation in relation to selenium speciation, and most recently an extensive program of validation and updates to the science-based benchmarks under Teck's Adaptive Management Plan (AMP). This program was undertaken to answer Management Question (MQ) 2 under the AMP: Will the aquatic ecosystem be protected by meeting the long-term site performance objectives? and associated key uncertainty 2.1: How will the science-based benchmarks be validated and updated? The MQ2 program was developed with input from the Elk Valley Environmental Monitoring Committee (EMC) and results have been shared with the EMC on an ongoing basis since the program began.

A key outcome of the MQ2 program was the development of an updated compilation of chronic toxicity information for nitrate, sulphate, and selenium, including information available at the time of the EVWQP and studies conducted after the EVWQP. For nitrate and sulphate, the updated compilation represented a substantial increase in available toxicity information for key test species. This updated compilation was used to validate the EVWQP benchmarks and, where warranted, to derive updated effects concentrations that incorporate this new information (WSP Golder 2022). As in the EVWQP, the objective was to derive scientific best estimates of concentrations associated with no effects or defined levels of potential chronic, sublethal effect to sensitive species and life stages relevant to the Elk Valley. The analysis in WSP Golder (2022) concluded that the updated effects concentrations for nitrate and sulphate are supported by a larger dataset covering a wider range of conditions than was available at the time of the EVWQP, and thereby provide an improved basis for evaluating potential effects of these constituents. Dataset comparisons for the EVWQP and updated effects concentrations (UECs) for nitrate and sulphate are summarized in Appendix Table E.2.

2.3 Primary and Secondary Productivity and Benthic Community Structure

2.3.1 Primary Productivity

Periphyton coverage was visually scored in September 2022 at each sampling area (Figure 2.1, Table 2.5). Periphyton visual scores were collected using the methods described in Appendix A4. Results were evaluated by calculating the mean score and standard deviation for each area and comparing these spatially (upstream and downstream of the AWTF) and temporally (among years for each area) to assess changes in productivity.

2.3.2 Secondary Productivity and Invertebrate Community Structure (Hess Sampling)

Samples for analysis of benthic invertebrate density, biomass, and community structure were collected using Hess methods in September 2022 from two areas in Line Creek downstream from the WLC AWTF (RG_LILC3 and RG_LIDSL), and at two reference areas (RG_SLINE and RG_LI24) in accordance with the 2021 LCO LAEMP study design (Minnow 2021b). Five samples

Table 2.5: Primary and Secondary Productivity and Benthic Invertebrate Community Sampling Completed in Line Creek and Fording River in September 2022 Compared to the LCO LAEMP Study Design (Minnow 2021a)

Area Type	Biological Sampling			
	Biological Area Code	Periphyton	Benthic Invertebrates	
		Visual Coverage Score	Kick Sampling (Community)	Hess Sampling (Density, Biomass, Community)
Reference	RG_SLINE	n=5 (√)	n=3 (√)	n=5 (√)
	RG_LI24	n=5 (√)	n=3 (√)	n=5 (√)
Mine-exposed Line Creek	RG_LCUT	n=5 (√)	n=1 (n=3)[a] (√)	-
	RG_LILC3	n=5 (√)	n=3 (√)	n=10 (√)
	RG_LISP24	n=5 (√)	n=1 (√)	-
	RG_LIDSL	n=5 (√)	n=3 (n=5)[a] (√)	n=10 (√)
	RG_LIDCOM	n=5 (√)	n=1 (√)	-
	RG_LI8	n=5 (√)	n=3 (√)	-
Mine-exposed Fording River	RG_FRUL	n=5 (√)	n=1 (n=3)[a] (√)	-
	RG_FO23	n=5 (√)	n=1 (n=5)[a] (√)	-

Notes: "-" = not sampled; "√" = target sample size was met.

[a] Numbers in brackets are replicates required by the RAEMP study design and were utilized for the LCO LAEMP (Minnow 2021a).

were collected at each reference area and 10 at each mine-exposed area (Figure 2.1, Table 2.5; see Appendix A5.3.1 for detailed sample collection methodology).

2.3.2.1 Laboratory and Data Analysis

Benthic invertebrate biomass samples were sent to ZEAS Inc. (lead taxonomist Danuta Zaranko) in Nobleton, ON, for sorting and taxonomic identification to the family-level of taxonomy. Total organism abundance and biomass was reported at the family-level for each sample (see Appendix A5.3.2 for detailed laboratory analysis methods, see Appendix H for raw data).

Prior to data analysis, data were converted to standard area-based measures using the surface area sampled (0.1 m^2 for each sample). Benthic invertebrate productivity and community structure were evaluated based on total biomass (g/m^2 wet weight), total density ($\#/m^2$), and density of major taxonomic groups (EPT, Ephemeroptera, and Chironomidae). Temporal changes in benthic invertebrate biomass and density were evaluated using an Analysis of Variance (ANOVA) model to compare areas (mine-exposed to reference) and years (different operational periods; see Appendix A5.3.3 for detailed data analysis methods).

2.3.3 Benthic Invertebrate Community Structure (Kick and Sweep Sampling)

Benthic invertebrate community sampling in 2022 was completed in accordance with the 2021 LCO LAEMP study design (Minnow 2021b). Three kick and sweep replicate samples per area were collected in September 2022 from areas downstream of the AWTF outfall that have been monitored consistently over time (RG_LILC3, and RG_LI8) and at each reference area (RG_SLINE, RG_LI24; Figure 2.1, Table 2.5). One sample per area was collected from RG_LISP24 and RG_LIDCOM to provide additional spatial resolution of community characteristics (Table 2.5). RAEMP monitoring requirements included a higher number of replicates at some areas than LCO LAEMP monitoring requirements (see Table 2.5 for details; Minnow 2021c), and as such, the higher required number of sample replicates were collected at these areas in 2022 (at RG_LCUT, RG_LIDSL, RG_FRUL, and RG_FO23).

Replicates were spaced a minimum of 50 m apart, where habitat allowed (i.e., riffle habitat was present). Effort was made to target similar habitats for collection of both benthic invertebrate community and tissue samples within each sampling area. Benthic invertebrate community samples were collected according to the Canadian Aquatic Biomonitoring Network (CABIN) protocol (detailed methodology can be found in Appendix A5.2.1; Environment Canada 2012).

2.3.3.1 Laboratory and Data Analysis

Benthic invertebrate community samples were sent to Cordillera Consulting (lead taxonomist Scott Finlayson), in Summerland, BC, for sorting and taxonomic identification. Total organism

abundance was reported for every distinct taxon identified in each sample (see Appendix H for raw data).

Benthic invertebrate community condition was evaluated based on total abundance, taxonomic richness (to the lowest practicable level of taxonomy), and the abundances and proportional abundances (%) of major taxonomic groups (EPT, Ephemeroptera, and Chironomidae). Analyses of benthic invertebrate community data were plotted to show changes over time relative to regional normal ranges[5] as well as site-specific normal ranges.[6] Benthic invertebrate community data collected in September were the focus of data analyses and interpretation and included all replicate samples collected in 2022 (i.e., those collected as requirements for the LCO LAEMP and RAEMP monitoring; see Appendix Sections A5.2.2 to A5.2.4 for detailed methodology).

2.4 Tissue Selenium Concentrations

2.4.1 Benthic Invertebrates

As outlined in Section 2.1, benthic invertebrate tissue selenium sampling in 2022 was completed in accordance with the 2021 LCO LAEMP study design (Minnow 2021b), and included sample collections in early May[7], July, September, and December 2022 (Table 2.6).

Samples were collected using the kick and sweep method described in Appendix A5.2, except collections were not timed, and kicking continued only until sufficient organisms were collected. All sampling events included collection of a composite sample of a variety of benthic invertebrate taxa (composite-taxa samples; see Appendix A5.4.1 for detailed methodology).

2.4.1.1 Laboratory and Data Analysis

Frozen samples were shipped by courier to TrichAnalytics Inc. in Saanichton, BC for analysis of metals concentrations (including mercury and selenium; see Appendix A5.4.2 for details). Analyses of composite-taxa benthic invertebrate tissue selenium data were completed using the following approaches (see Appendix A5.4.3 for detailed methodology):

[5] The reference normal range as presented in the RAEMP represents the 2.5th and 97.5th percentiles of the 1996 to 2019 (Minnow 2020b).

[6] Site-specific normal ranges represent the 2.5th and 97.5th percentile for a given area as determined by habitat predictors for that area in relation to the complete set of Elk Valley monitoring areas. The site-specific normal ranges were estimated using regression modelling as presented in the RAEMP (Minnow 2020b).

[7] The first sampling event of 2022 that occurred in May was meant to occur in April as the EMC expressed interest in further understanding the increase in benthic invertebrate tissue selenium concentrations that was previously observed during April sampling events (i.e., April 2020; Minnow 2021b) and for more information on the dietary exposure of WCT to selenium. However, the sampling crew was unable to collect data until early May due to illnesses.

Table 2.6: Benthic Invertebrate Composite-Taxa Tissue Selenium Sampling Completed in Line Creek and Fording River in 2022 Compared to the LCO LAEMP Study Design (Minnow 2021a)

Area Type	Biological Area Code	May 2 to 4	Jul 11 to 14	Sept 8 to 19	Nov 29 to Dec 2
Reference	RG_SLINE	n=5 (√)	n=5 (√)	n=5 (√)	n=5 (√)
	RG_LI24	n=5 (√)	n=5 (√)	n=5 (√)	n=5 (√)
Mine-exposed	RG_LCUT	n=5 (√)	n=5 (√)	n=5 (√)	n=5 (√)
	RG_LILC3	n=5 (√)	n=5 (√)	n=5 (√)	n=5 (√)
	RG_LISP24	n=5 (√)	n=5 (√)	n=5 (√)	n=5 (√)
	RG_LIDSL	n=5 (√)	n=5 (√)	n=5 (√)	n=5 (√)
	RG_LIDCOM	n=5 (√)	n=5 (√)	n=5 (√)	n=5 (√)
	RG_LI8	n=5 (√)	n=5 (√)	n=5 (√)	n=5 (X)
	RG_FRUL	n=5 (√)	n=5 (√)	n=5 (√)	n=5 (√)
	RG_FO23	n=5 (√)	n=5 (√)	n=5 (√)	n=5 (X)

Notes: AWTF = Active Water Treatment Facility. AOP = Advanced Oxidation Process. " √" = target sample size was met. "X" = target sample size was not met due to unsafe conditions (ice) in the area.

- Graphical comparison of tissue selenium concentrations relative to applicable benchmarks and the regional normal range;
- Comparison of observed tissue selenium concentrations to those predicted using a selenium bioaccumulation tool;
- Evaluation of changes in tissue selenium concentrations among AWTF operational phases, within the AWTF with AOP operational phase (2019 to 2022), and within sampling events in 2022, at mine-exposed areas relative to reference, and in the Fording River downstream relative to upstream of Line Creek, using a two-way ANOVA;
- Evaluation of differences in tissue selenium concentrations among sampling areas during each sampling event in 2022 using a two-way ANOVA;
- Quantification of changes in benthic invertebrate selenium concentrations at the reference area RG_SLINE since 2017 (before and after a change in analytical laboratory in 2020).

2.4.2 Fish

Three species make up the fish community of Line Creek including BT, WCT, and mountain whitefish. WCT and BT are the dominant species, while mountain whitefish are present only in certain reaches of Line Creek and only as adult and at low densities (Zathey 2021). Therefore, data interpretation in relation to only BT and WCT was the focus of this report.

Fish tissue monitoring (which was completed in previous years; Minnow 2018b, 2019a, 2020a) was excluded from the 2020 to 2022[8] LCO LAEMP in an effort to reduce sampling stress on BT and WCT (Cope 2020) in Line Creek related to LAEMP monitoring activities. However, fish monitoring was conducted at LCO in 2022 as part of confirmatory sampling for the RAEMP and targeted eight WCT from near RG_LIDSL in September. Typically, muscle plug sampling is conducted just prior to spawning, however, a comparison of WCT muscle selenium concentrations from May (i.e., prior to spawning) and late August/September (i.e., post-spawning) in 2015 under the RAEMP showed no differences among seasons for this species (Minnow 2018a). Subsequent WCT sampling efforts targeting non-lethal muscle samples under the RAEMP were therefore planned for early September to avoid capture stress on gravid females (Minnow 2018d, 2021c).

[8] Although, fish tissue monitoring was included in past LCO LAEMP study designs (2017 to 2019; Minnow 2017c, 2018c, and 2019b), the 2022 LCO LAEMP study design did not include fish tissue selenium monitoring. The initial 2020 LCO LAEMP study design (Minnow 2020c) included fish tissue selenium monitoring, however it was later removed (June 3rd, 2020, Minnow 2020d) as a proactive measure in response to declines in the Upper Fording River WCT population (Cope 2020) and feedback from the EMC and the Elk Valley Fish and Fish Habitat Committee (EVFFHC). The exclusion of fish tissue monitoring from the 2022 and 2021 LCO LAEMP study design is consistent with the revised 2020 LCO LAEMP study design and discussed with the EMC on March 8th, 2021.

Tissue samples were also collected from any incidental fish mortalities that were discovered at LCO in 2022 (subject to the condition mortality), which included one BT sample. Samples were collected using the methods described in Appendix A6.1.

2.4.2.1 Laboratory and Data Analysis

Frozen fish muscle samples were shipped by courier to TrichAnalytics Inc. in Saanichton, BC for analysis of metals concentrations (including mercury and selenium; see Appendix A6.2 for details). Analyses of fish tissue selenium data were completed using the following approaches (see Appendix A6.3 for detailed methodology):

- Estimation of ovary selenium concentrations using muscle selenium results (as described below);
- Tabulation of muscle and estimated ovary selenium concentrations with corresponding meristics data (total weight, length and fork length);
- Graphical comparison of muscle and estimated ovary selenium concentrations to applicable EVWQP tissue benchmarks and to previous data (2001 to 2022);
- Comparison of estimated ovary tissue selenium concentrations to the upper prediction interval calculated using a selenium bioaccumulation tool.

Site-specific benchmarks were derived in the EVWQP based on fish egg/ovary selenium concentrations because measurement of selenium in eggs or ripening ovaries is the most direct way to evaluate potential effects of selenium on fish reproduction (Janz et al. 2010; Golder 2014; USEPA 2016; Golder 2014). Selenium concentrations in fish eggs/ovaries can be estimated from muscle for fish species that exhibit a strong muscle-to-ovary selenium relationship. A strong ovary-to-muscle relationship for selenium concentrations has been characterized for WCT, of about 1.6-times the concentrations in muscle of the same fish, which is utilized as an indirect means of evaluating potential effects of selenium on fish reproduction (and for BT, 3.3-times; Appendix Tables D.11 and D.12; Nautilus and Interior Reforestation 2011).

Although fish tissue monitoring was limited to RG_LIDSL in 2022, benthic invertebrate and fish tissue quality monitoring completed for the LCO LAEMP has demonstrated that changes in fish tissue selenium concentrations between 2017 and 2019 were corroborated by those reported for benthic invertebrates (Minnow 2020c). As such, benthic invertebrate tissue selenium monitoring is expected to be sufficient to evaluate potential effects of AWTF with AOP operation on selenium concentrations in biota in the receiving environment.

3 PRODUCTIVITY

3.1 Overview

Monitoring data were evaluated in this section to address Study Question #1: Is active water treatment affecting biological productivity downstream in Line Creek? To address this study question, primary and secondary productivity monitoring endpoints and aqueous nutrient concentrations were evaluated in relation to the AWTF operational status. The AWTF with AOP was operational throughout 2022 with discharge to the receiving environment occurring throughout the year (see Section 1.2 for details).

3.2 Site Performance Objectives and Aqueous Nutrient Concentrations

As outlined in Section 1.2, the AWTF treatment process requires the addition of phosphorus, giving the potential for increased phosphorus concentrations downstream in Line Creek during AWTF operation. The site performance objectives (SPO) are limits applied and measured at the compliance point (LC_LCDSSLCC) to track daily and monthly exceedances during certain time periods and are applied to total phosphorus and nitrate.

Aqueous total phosphorus concentrations at the Compliance Point were consistently below the SPO of 0.02 mg/L throughout 2022, including the growing season (June 15 to September 30) to which the SPO applies (Figure 3.1). These results align with the previous three years of total phosphorus measured during AWTF with AOP operation (2019 to 2021; Minnow 2020a, 2021a and 2022). Aqueous phosphate and orthophosphate concentrations in 2022 were within the range of results reported prior to AWTF operation (i.e., 2012 to 2015, excluding initial operations in 2014; Figures 3.2 and 3.3; Appendix Figure C.1 and C.2). Total phosphorus and orthophosphate concentrations were evaluated using an approach recommended in the Proposal to Update the Site Performance Objective for Phosphorus in Line Creek (Minnow 2017b[9]). The purpose was to facilitate the early detection of potential changes in concentrations of these aqueous nutrients downstream of the AWTF. The evaluation involves the comparison of monthly mean concentrations of total phosphorus and orthophosphate to the upper range (97.5th percentile) of concentrations observed in each month during the baseline (pre-AWTF) period at LC_LC3 (upper panels in Figures 3.2 and 3.3). Monthly mean concentrations were then expressed as a ratio of the baseline 97.5th percentile for each month (bottom panels in Figures 3.2 and 3.3). In 2022, total phosphorus and orthophosphate concentrations at LC_LC3 were below the baseline 97.5th percentiles, with three exceptions (Figures 3.2 and 3.3). Specifically, the mean total phosphorus concentration at LC_LC3 was slightly higher than the baseline 97.5th percentile

[9] Included as Appendix C in Minnow (2017b).

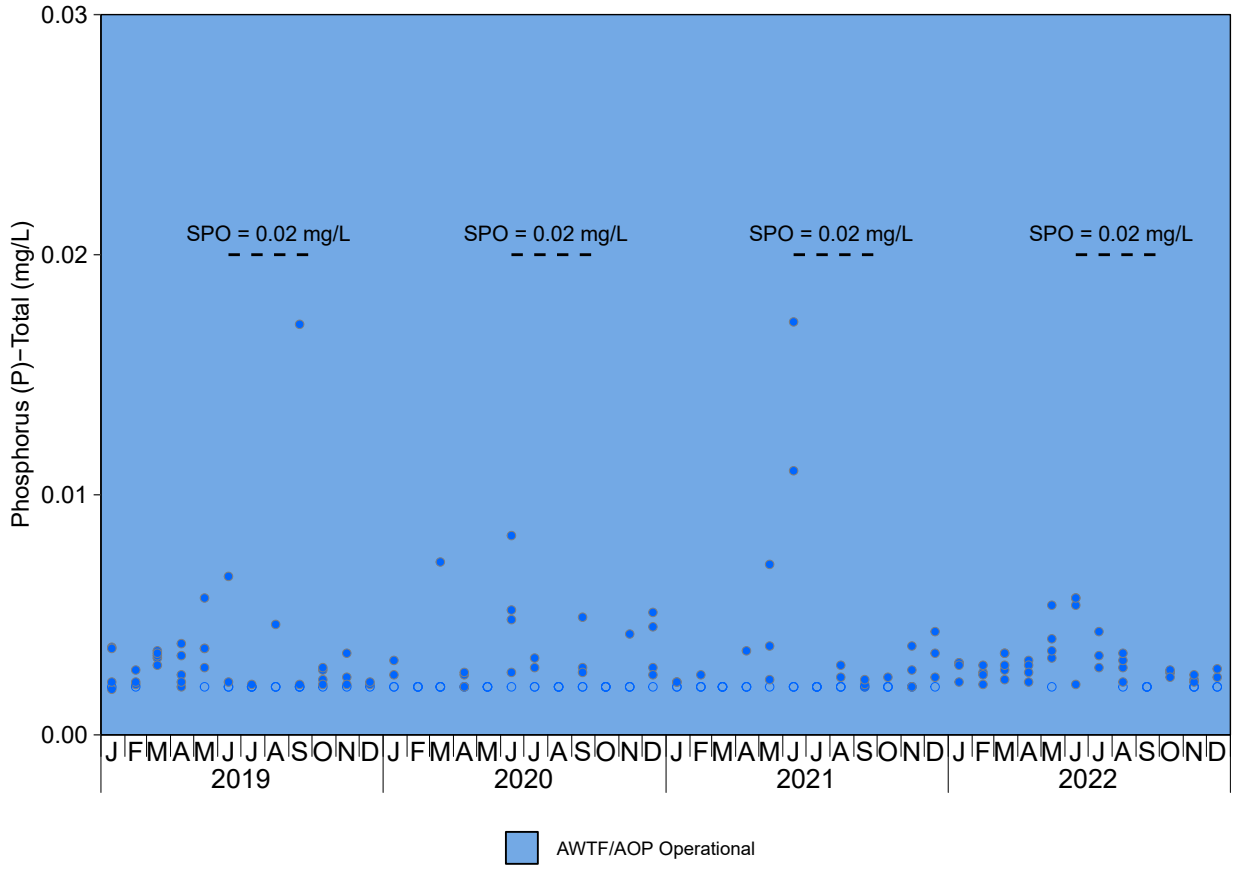

Figure 3.1: Total Phosphorus Concentrations in Water Collected from the Line Creek Compliance Point (LC_LCDSSLCC), 2019 to 2022

Notes: SPO = Site Performance Objective (0.02 mg/L). This pertains to the compliance point (LC_LCDSSLCC) only, as a growing season average calculated from measurements collected every two weeks between June 15th and September 30th, annually. If multiple results existed for a given location and day, the Kaplan−Meier mean of the duplicates was presented. Open symbols represent results below the laboratory reporting limit (LRL).

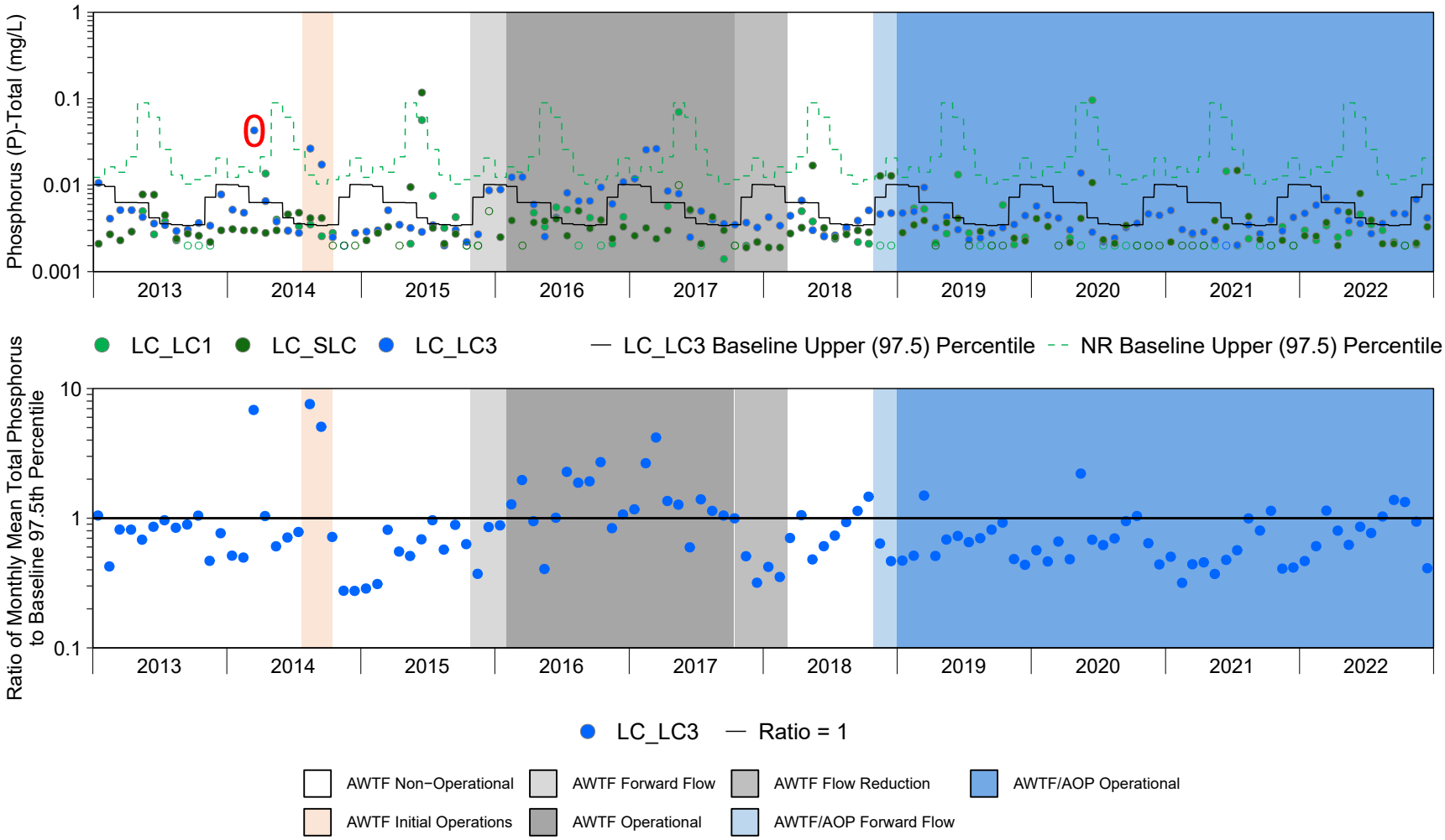

Figure 3.2: Total Phosphorus at LC_LC3 During AWTF Operation Relative to Pre-Operational Baseline Concentrations, 2013 to 2022

Notes: Top panel shows monthly mean concentrations at LC_LC3 and reference stations relative to the monthly percentiles for the baseline period prior to AWTF operation. The data used to define the baseline 97.5th percentile for each month were concentrations for the specified month, the preceding month and the following month for unshaded months prior to 2018 shown in panels. The normal range (NR) was calculated from the 97.5 percentile in the Nutrient Evaluation (Minnow, 2020b). Concentrations less than the laboratory reporting limit (LRL) are shown as open symbols at the LRL. Red circle indicates outlier excluded from the calculation of baseline percentile. Bottom panel presents the ratio of monthly mean concentrations at LC_LC3 relative to the baseline 97.5th percentile for the corresponding month.

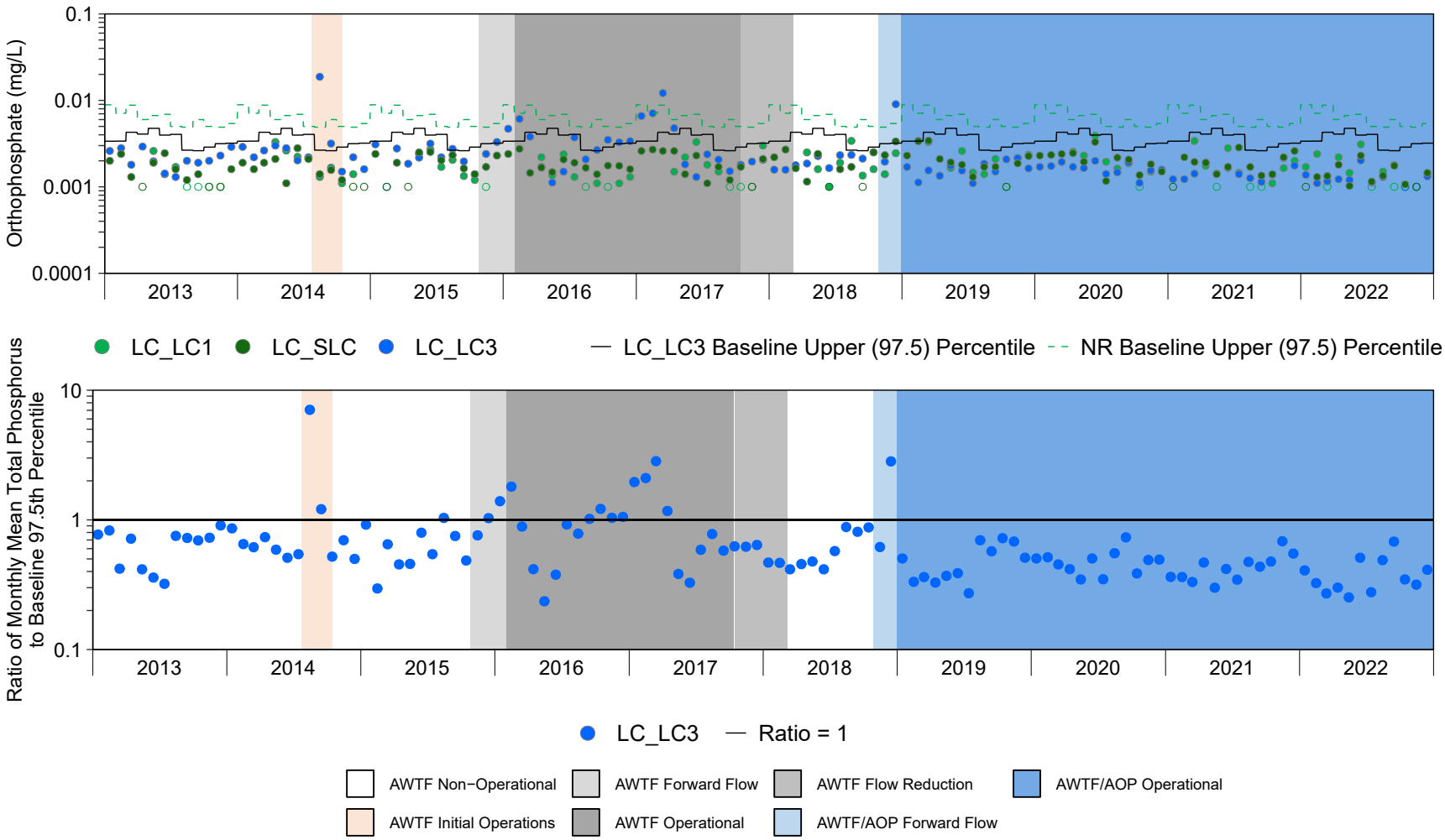

Figure 3.3: Orthophosphate at LC_LC3 During AWTF Operation Relative to Pre-Operational Baseline Concentrations, 2013 to 2022

Notes: Top panel shows monthly mean concentrations at LC_LC3 and reference stations relative to the monthly percentiles for the baseline period prior to AWTF operation. The data used to define the baseline 97.5th percentile for each month were concentrations for the specified month, the preceding month and the following month for unshaded months prior to 2018 shown in panels. The normal range (NR) was calculated from the 97.5 percentile in the Nutrient Evaluation (Minnow, 2020b). Concentrations less than the laboratory reporting limit (LRL) are shown as open symbols at the LRL. Bottom panel presents the ratio of monthly mean concentrations at LC_LC3 relative to the baseline 97.5th percentile for the corresponding month.

in April, September, and October 2022 (Figure 3.2). These results are consistent with the 2019 to 2021 LCO LAEMP (i.e., monitoring which also occurred during the AWTF with AOP operational phase). In contrast, the total phosphorus and orthophosphate concentrations during AWTF without AOP operation (in 2016 and 2017) were frequently greater than the baseline 97.5th percentiles at LC_LC3. Overall, operation of the AWTF with AOP has been more successful at minimizing phosphorus and orthophosphate contributions to the receiving environment than operations of the AWTF without AOP.

One function of the AWTF is to decrease nitrate loads to the receiving environment, and the AWTF with AOP removed 35,015 kg of nitrate during operations in 2022 (Teck 2023a), which is similar to 2021 (35,469 kg of nitrate in 2021, Teck 2022a). Aqueous nitrate concentrations at the Compliance Point were below the SPO Daily Maximum Limit of 9 mg/L for most of 2022 (65%; Teck 2023b) but were higher than the daily SPO on 18 occasions as well as the monthly average compliance limit (7 mg/L) in all months except May, June, and July (see Teck 2023 for details). Aqueous nitrate concentrations downstream of the AWTF discharge in 2022 were towards the low end of the range of concentrations reported prior to AWTF operation (i.e., 2012 to 2015, excluding initial operations in 2014; Figure 3.4; Appendix Figure C.3). In 2022, as with previous years, nitrate concentrations in samples from mine-exposed monitoring stations upstream and downstream of the AWTF discharge were above the long-term British Columbia Water Quality Guideline (BCWQG; 95 to 100% of samples in each area; Appendix Figure C.3; Appendix Tables E.1 and E.2). In 2022, nitrate Updated Effects Concentrations (UECs) were established and replaced the previous EVWQP benchmarks. The UECs have been verified as more predictive of and sensitive to the concentration-response relationship for the receptor group than the EVWQP benchmarks (Appendix Table E.1; see Golder 2022b). Nitrate concentrations did not exceed the UECs at any of the areas upstream of the AWTF discharge [reference (RG_SLINE and RG_LI24) or mine-exposed (RG_LCUT) areas] or at most of the areas downstream of the AWTF outfall in 2022. The only UEC exceedances were at LC_LC3, the nearest downstream area to the AWTF, where 3% of concentrations exceeded the Level 2 UEC (Appendix Figure C.3 and Appendix Table E.2).

3.3 Primary Productivity Indicators

In 2022, mean periphyton coverage was moderate at eight of the ten study areas (Appendix Figure C.4; Appendix Table C.1), with visual scores between two and three (of a possible range from one [rocks not slippery and no obvious colour] to five [rocks mostly obscured by algae mat]). The two exceptions were RG_LILC3 and RG_FRUL, which had a mean visual score of 3.2 and 1.2, respectively. The moderate visual periphyton scores for 2022 are similar to those from 2021 (change in scores less than 0.6), with the exception of RG_LIDSL which had a

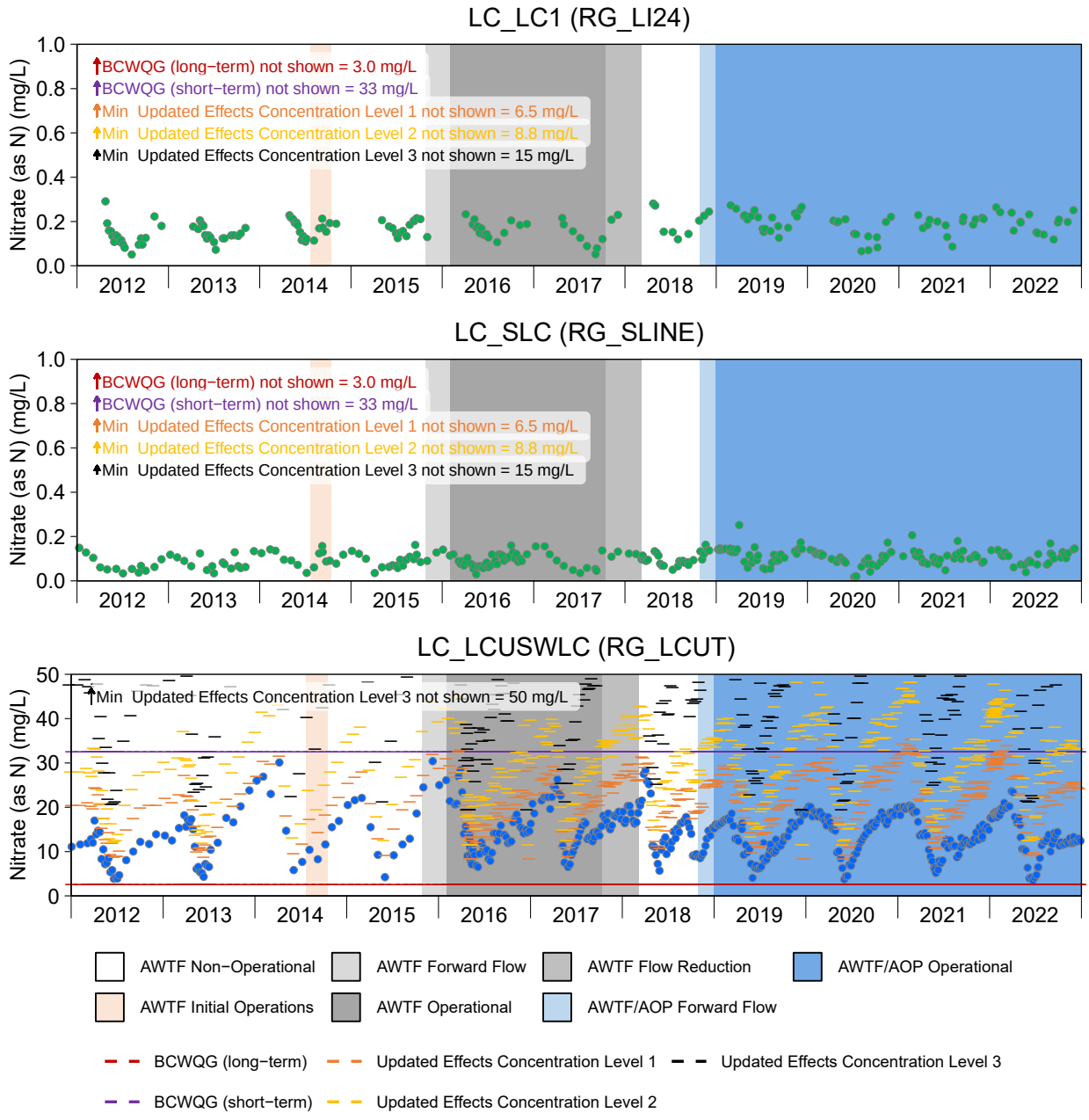

Figure 3.4: Time Series Plots for Nitrate from from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

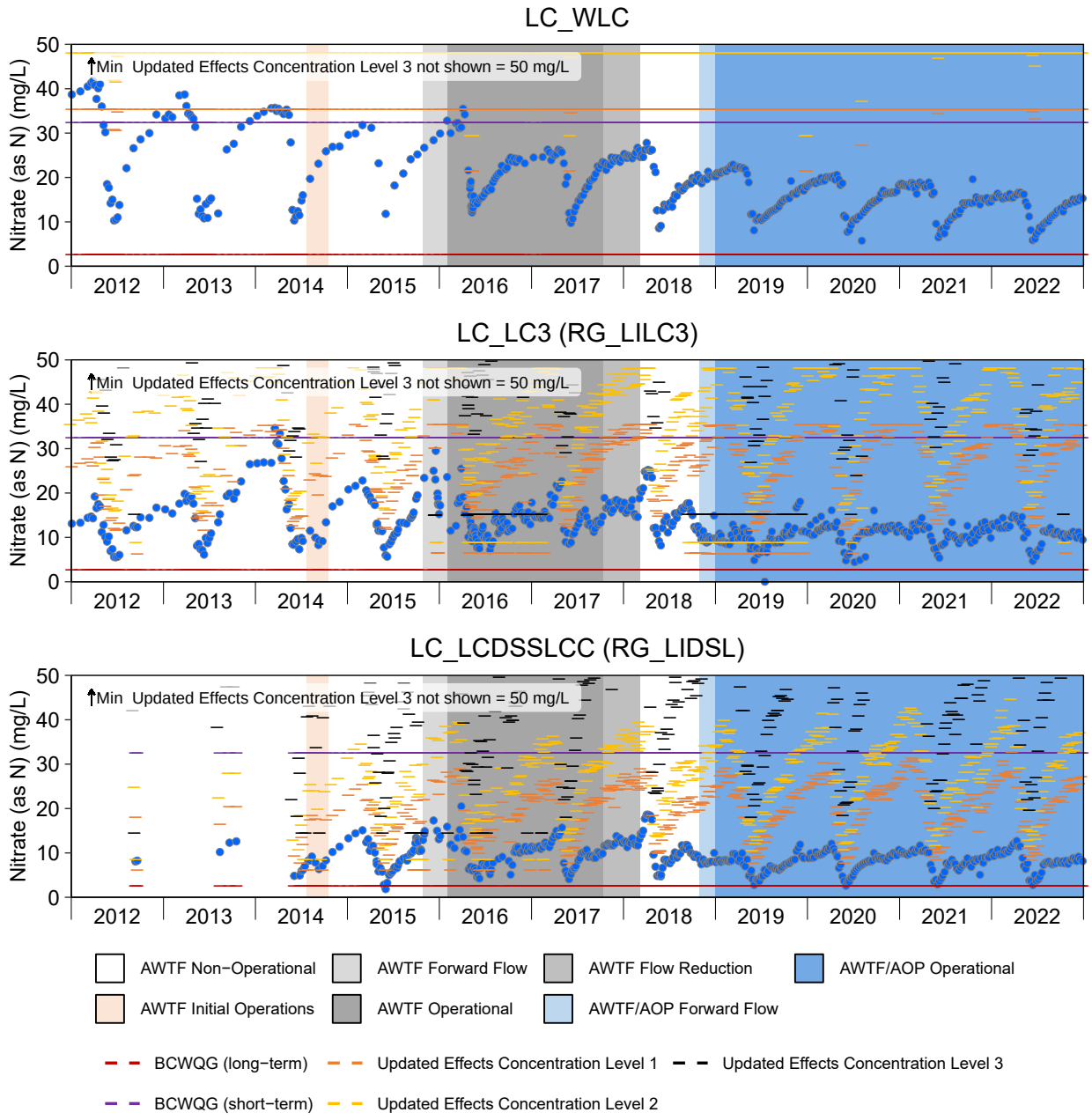

Figure 3.4: Time Series Plots for Nitrate from from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

higher periphyton score in 2020 and 2021 compared to 2022 (mean = 2.2 in 2022; Minnow 2021a, Minnow 2022). The periphyton scores from RG_LILC3 and RG_LIDCOM in 2020 were higher than all other years; scores at these sites in 2022 were more similar to those in 2021 and prior to 2020. As such, it is likely that the increased periphyton coverage in 2020 was an isolated event that may have been related to environmental factors that could have influenced periphyton growth during that year (e.g., lower water depth and flows, and/or increased temperatures).

3.4 Secondary Productivity Indicators

Analyses of the potential changes in benthic invertebrate biomass and density at mine-exposed areas RG_LILC3 and RG_LIDSL (immediately downstream of the AWTF discharge and the Compliance Point, respectively) relative to changes at the reference areas (RG_LI24 and RG_SLINE) over the same time period were performed excluding two outlier values for the reference area RG_SLINE (Figures 3.5 and 3.6; see Section 2.4 and Appendix A for data ANOVA methods, including outlier removal). Benthic invertebrate biomass at RG_LILC3 in 2022 was not significantly different to previous years, with no significant temporal differences noted between 2014 and 2022 when evaluated either for RG_LILC3 only or for RG_LILC3 relative to reference over time (Figure 3.5; Appendix Tables C.2 and C.3). No significant temporal differences were noted for biomass at RG_LIDSL from 2014 to 2022 when evaluated at the mine-exposed area only, but subtle temporal differences were noted in 2022 and 2019 where biomass differences between the mine-exposed and reference area were significantly less compared to differences in 2014 (during AWTF initial operations), likely due to an increase in biomass at the reference areas rather than a change at the mine-exposed area. Otherwise, biomass at RG_LIDSL has been stable over the four years of AWTF with AOP operation when evaluated alone or relative to reference (Figure 3.5; Appendix Tables C.2 and C.3). Combined, the results at RG_LILC3 and RG_LIDSL did not indicate an increase in benthic invertebrate biomass associated with AWTF operation with AOP in 2019 to 2022.

Density at RG_LILC3 has been stable from 2014 to 2022 based on the evaluation of temporal changes at RG_LILC3 only (i.e., no significant differences among years; Figure 3.6, Table 3.1; Appendix Table C.3 and C.4). Density at RG_LILC3 relative to reference in 2022 was also similar to prior years (2014 to 2021; Appendix Table C.4). Overall, no increases in density at RG_LILC3 were noted (when compared to either reference area) when comparing years of AWTF with AOP (2019 to 2022) to previous years of evaluation (including pre-AWTF operation). Similarly, density at RG_LIDSL in 2022 showed no significant differences when compared to previous years (2014 to 2021) based on the evaluation of temporal changes at RG_LIDSL only. However, temporal differences were observed when density at RG_LIDSL was evaluated in relation to changes in reference over the same time frame, with the differences dependent on

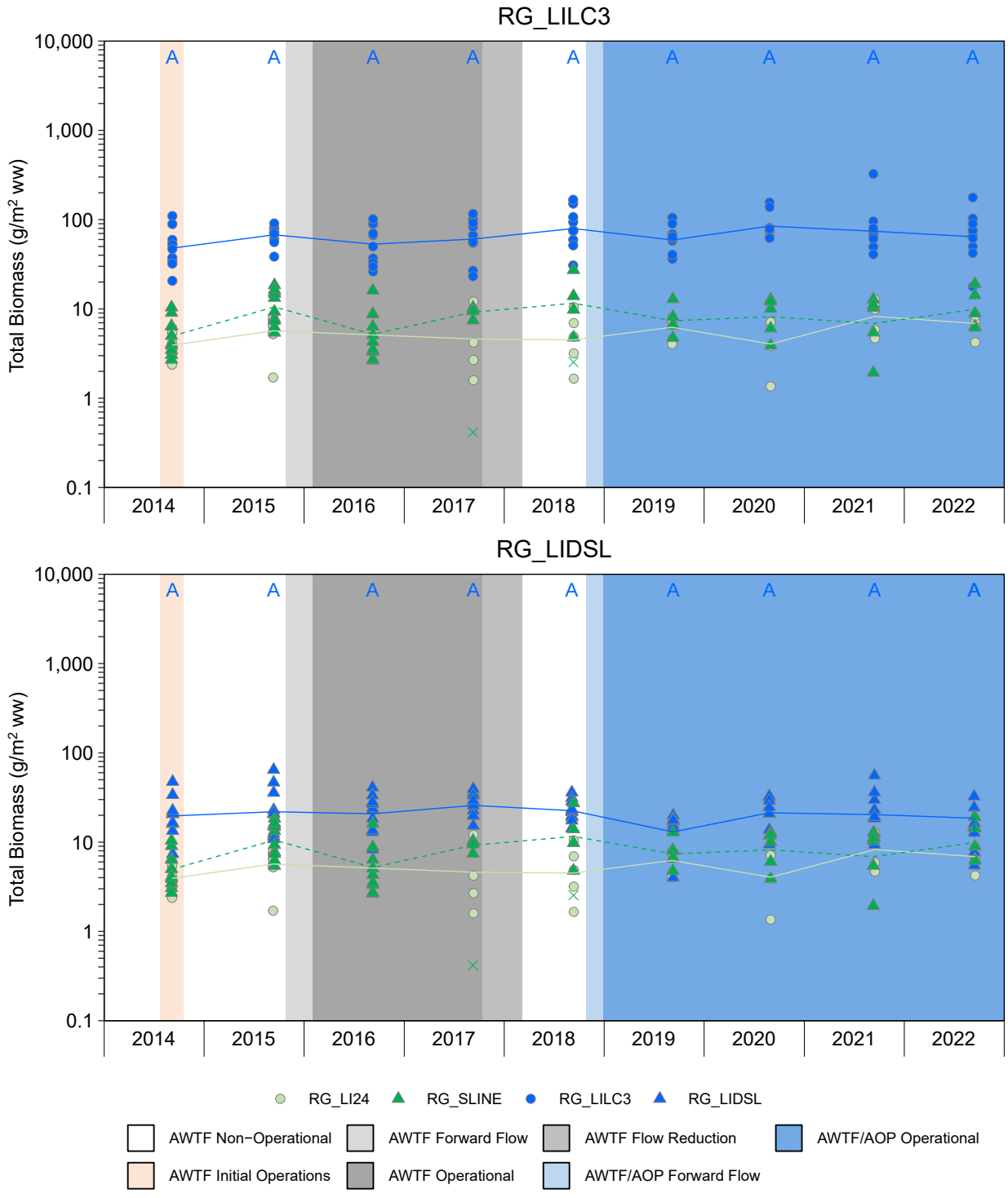

Figure 3.5: Total Benthic Invertebrate Biomass (Hess Sampling) for RG_LILC3 and RG_LIDSL, 2014 to 2022

Notes: Blue symbols represent mine-exposed areas and green symbols represent reference areas. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines are displayed for each monitoring area to provide context, but pertain only to mine−exposed monitoring areas located downstream of the AWTF discharge. Years that share a letter (e.g., A,B) were not significantly different (P−value > 0.1) in a Tukey HSD post−hoc contrast among years for the respective exposed station. Outliers not used in analysis plotted with an 'X'. Data from RG_LI24 in 2016 are not available.

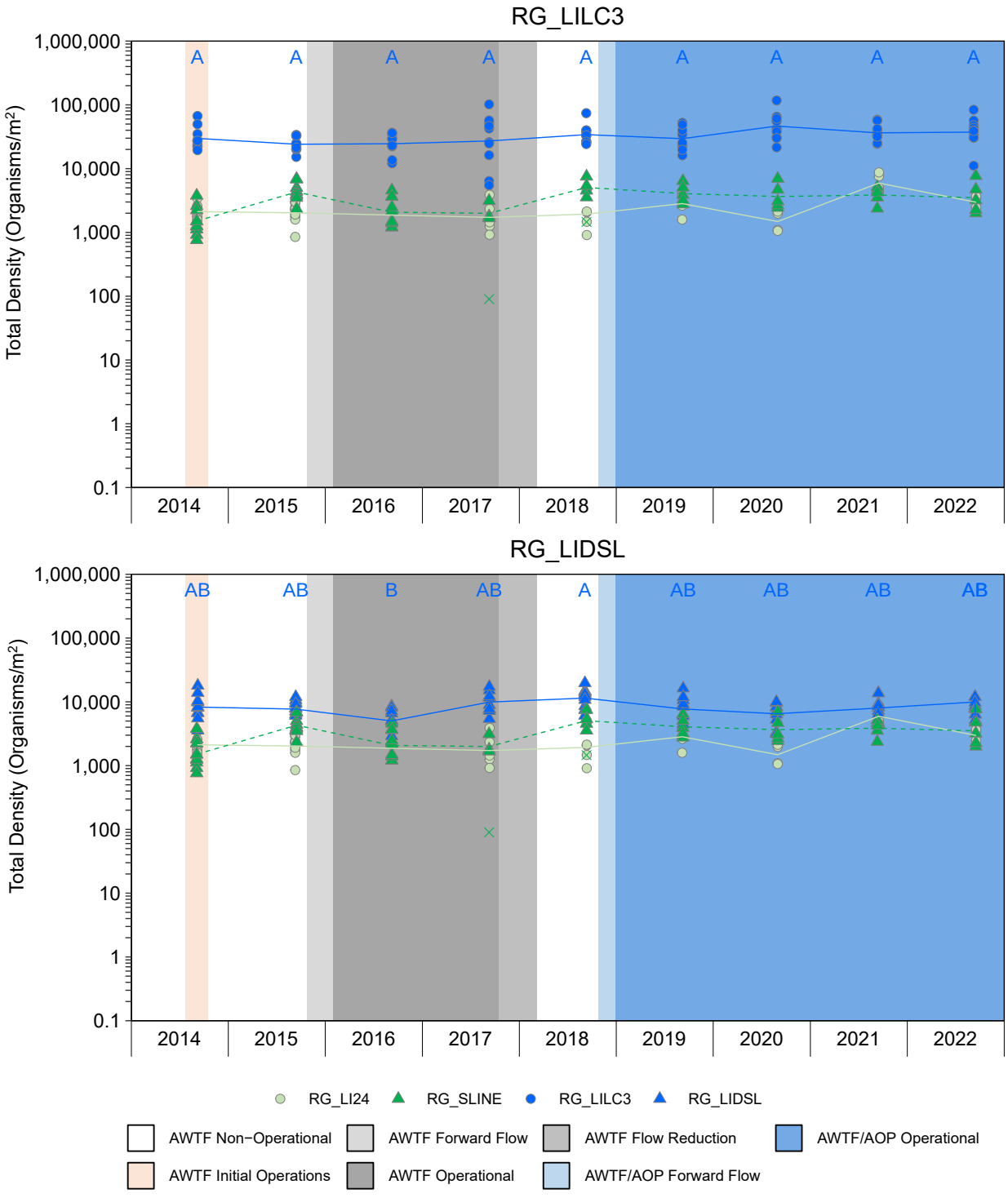

Figure 3.6: Total Benthic Invertebrate Density (Hess Sampling), for RG_LILC3 and RG_LIDSL, 2014 to 2022

Notes: Blue symbols represent mine-exposed areas and green symbols represent reference areas. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines are displayed for each monitoring area to provide context, but pertain only to mine−exposed monitoring areas located downstream of the AWTF discharge. Years that share a letter (e.g., A,B) were not significantly different (P−value > 0.1) in a Tukey HSD post−hoc contrast among years for the respective exposed station. Outliers not used in analysis plotted with an 'X'. Data from RG_LI24 in 2016 are not available.

Table 3.1: Geometric Means of Benthic Invertebrate Density for Hess Sampling in Areas of Line Creek, 2014 to 2022

Area	Benthic Invertebrate Density (# organisms/m^2)								
	2014	2015	2016	2017	2018	2019	2020	2021	2022
RG_LI24	2,120	2,028	-	1,723	1,933	2,834	1,482	5,940	2,970
RG_SLINE	1,508	4,300	2,072	1,072	5,062	4,067	3,659	3,857	3,502
RG_SLINE[a]	1,508	4,300	2,072	1,993	3,947	4,067	3,659	3,857	3,502
RG_LILC3	29,805	24,136	24,564	27,162	34,153	29,481	46,510	36,405	37,397
RG_LIDSL	8,276	7,690	5,024	9,910	11,452	7,718	6,506	7,992	7,733

Note: "-" = no data/not recorded.

[a] One outlier removed in 2017 and 2018.

reference area. Benthic invertebrate density at RG_LIDSL was not significantly different in 2022 when compared to previous years at RG_LI24 but was significantly lower than RG_SLINE in 2014 (Figure 3.6; Appendix Table C.4). Combined, the density results at RG_LILC3 and RG_LIDSL did not indicate an increase in benthic invertebrate density compared to both reference areas that was associated with AWTF operation with AOP in 2022 (which is consistent with results from 2019 to 2022).

Benthic invertebrate abundance in kick and sweep samples from 2022 were mostly within or above the regional and site-specific normal ranges in mine-exposed areas Line Creek (both upstream and downstream of the AWTF discharge) and in the Fording River (Appendix Figure C.5, Appendix Table C.5). Total sample abundance at mine-exposed areas downstream (RG_LILC3, RG_LISP24, RG_LIDSL, RG_LIDCOM, RG_LI8, and RG_FO23) of the AWTF discharge in 2022 was within the range of previous AWTF operational years (with or without AOP; Appendix Figure C.5). These results are consistent with the benthic invertebrate biomass and density results discussed above.

In summary, monitoring data indicated that secondary productivity in Line Creek was not affected by AWTF with AOP operations in 2022. This is consistent with the similarity in aqueous nutrient concentrations (Section 3.2) and primary productivity results (Section 3.3) in 2022 relative to previous years of AWTF with AOP operation (2019 to 2021) but also those prior to AWTF operation.

3.5 Benthic Invertebrate Community Structure

Endpoints related to benthic invertebrate community structure were evaluated relative to regional normal ranges and site-specific ranges defined in the RAEMP (Minnow 2020b). Community taxa richness [i.e., number of different taxa identified to lowest practical level (LPL) of identification] was within or above the regional normal range and site-specific normal range at mine-exposed and reference sampling areas in 2022 except the mine-exposed area upstream of the AWTF (RG_LCUT; Appendix Figure C.6, Appendix Table C.5). Taxon richness at RG_LILC3 in 2022 was similar to 2021 and 2020 and higher than 2018 and 2019, which suggests taxon richness has stabilized over four years of AWTF with AOP operation (Appendix Figure C.6). Lower taxon richness in 2022, 2019 and 2018 relative to 2020 and 2021 at RG_LCUT (Appendix Figure C.6), which is upstream of the AWTF discharge, suggests that fluctuations are likely due to natural variability or conditions further upstream (Appendix Figure C.6).

In 2022, percent EPT fell below the regional normal and site-specific ranges at mine-exposed areas upstream of the AWTF (RG_LCUT) and at two areas downstream of the AWTF discharge (RG_LILC3 and RG_LIDCOM; Appendix Figure C.7, Appendix Table C.5). At RG_LISP24 and RG_LIDSL (which are located between RG_LILC3 and RG_LIDCOM), percent EPT in 2022 was

within the regional normal range. Percent EPT fell below the site-specific range at RG_LISP24 in 2022 but was higher than in previous years, while percent EPT for most replicates at RG_LIDSL were within the site-specific range (Appendix Figure C.7, Appendix Table C.5). At RG_LIDCOM percent EPT was the lowest since monitoring began in 2017, however, since no decrease was observed in upstream areas the decrease is likely due to natural variation in community composition. At the other areas located downstream of AWTF in Line Creek (RG_LI8 and RG_FO23), EPT percentages were within the regional and site-specific ranges in 2022 (Appendix Figure C.7, Appendix Table C.5) as well as higher than the last three years of evaluation (2019 to 2021).

Percent Ephemeroptera (mayflies) results in 2022 showed a spatial pattern generally consistent with the percent EPT results. Ephemeroptera percentages fell below the regional and site-specific ranges at mine-exposed areas upstream (RG_LCUT) of the AWTF and immediately downstream of the AWTF discharge (RG_LILC3; Appendix Figure C.8, Appendix Table C.5; Minnow 2022). Percent Ephemeroptera at these sites was lower than those seen in 2021 but more comparable to values seen in 2019 (RG_LCUT and RG_LILC3) and 2020 (RG_LILC3; Appendix Figure C.8). RG_LISP24 had the highest percent Ephemeroptera observed since monitoring began in 2017, which is consistent with the change in percent EPT results discussed previously. At areas located further downstream (RG_LIDSL, RG_LIDCOM, RG_LI8, and RG_FO23), percent Ephemeroptera in 2022 was within the regional normal range and most results were also within the site-specific normal range, except at RG_LIDCOM (similar to the results for % EPT; Appendix Figure C.8, Appendix Table C.5). Results from mine-exposed areas of Line Creek in 2022 were within or higher than the range of previous years, and higher than the range prior to the commissioning of the AOP. Higher percent Ephemeroptera at areas further downstream from the AWTF, specifically RG_LISP24, RG_LIDSL, RG_LI8, and RG_FO23 have been observed during AWTF with AOP operation (2019 to 2022) compared to results observed when the AWTF did not have AOP (Appendix Figure C.7). It should be noted that decreases in percent Ephemeroptera as well as percent EPT in 2022 relative to 2021 were also noted at RG_LCUT (upstream of the AWTF discharge), and thus decreases in these endpoints at RG_LILC3 between 2021 and 2022 may be attributed to the influences other than those related to the AWTF with AOP operation. Regardless, increases or stability in these indices (percent EPT and percent Ephemeroptera) during the AWTF with AOP period (when compared to AWTF without AOP) at further downstream areas of the AWTF discharge (i.e., RG_LISP24, RG_LIDSL, RG_LIDCOM, RG_LI8, and RG_FO23) is suggestive of an improvement or stabilization in benthic invertebrate community structure.

Percent Chironomidae in 2022 was above or within the reference normal range at areas immediately upstream (RG_LCUT) and at all areas downstream from the AWTF (RG_LILC3 and

RG_LIDCOM above, RG_LISP24, RG_LIDSL, RG_LI8 and RG_FO23 within; Appendix Figure C.9, Appendix Table C.5). The percentage of Chironomidae at RG_LISP24 was lower than previous years, with percent Chironomidae being slightly below the reference normal range (Appendix Figure C.9). Percent Chironomidae at RG_LISP24 has decreased from 2019 which coincides with the increase in percent EPT during this same time frame; additionally, percent Chironomidae at RG_LIDCOM has increased in 2022 which aligns the concurrent decrease in percent EPT (Appendix Figures C.7 and C.9).

Percent EPT was also assessed against the biological trigger established for this endpoint (information pertaining to the determination of the biological trigger value can be found in Appendix F). This was completed for LCO LAEMP monitoring areas with available water quality predictions (i.e., five mine-exposed areas [RG_LCUT, RG_LILC3, RG_LIDSL, RG_LI8, and RG_FO23] and the two reference areas [RG_SLINE and RG_LI24]). In 2022, four of the five mine exposed areas evaluated had percent EPT replicates that corresponded to a biological trigger (i.e., percent EPT was below the biological trigger), including RG_LCUT (the area upstream of the AWTF discharge), RG_LILC3 (the area in closest proximity to the AWTF discharge), RG_LIDSL (compliance point) and RG_FO23 (area at the confluence of the Fording River and Line Creek). In contrast, percent EPT in 2021 at RG_LIDSL did not have any replicates meet the biological trigger (Minnow 2022), however in 2020 all five mine-exposed sites had at least one replicate correspond to a biological trigger (Minnow 2021a). Percent EPT at these areas has previously been flagged for further investigation in the RAEMP based on benthic invertebrate community results (Minnow 2020b). Further information regarding the percent EPT biological trigger as it pertains to the LCO LAEMP can be found in Appendix F.

3.6 Summary

Total phosphorus concentrations at the Compliance Point (LC_LCDSSLCC) were below the SPO of 0.02 mg/L during the 2022 growing season (June 15 to September 30), consistent with previous years. Aqueous nutrient concentrations (total phosphorus, orthophosphate, and nitrate) in 2022 were generally within the range observed prior to AWTF operation. In addition, results suggest that operation of the AWTF with AOP from 2019 to 2022 was more successful at minimizing phosphorus and orthophosphate contributions to the receiving environment than during the AWTF operational phase without AOP (in 2016 and 2017).

Periphyton coverage at all mine-exposed areas (as well as reference) was moderate in 2022, (based on the CABIN visual assessment, see Section 2.3) and was consistent with results from previous years. Areas RG_LILC3 and RG_LIDCOM showed lower periphyton coverage in 2022 compared to 2020 but were similar to results in 2021 and from 2017 to 2019 suggesting that the

increased scores in 2020 were an isolated event likely associated with variability in environmental factors. Benthic invertebrate biomass and density at mine-exposed areas of Line Creek showed no significant increases in 2022 when compared to previous years that could be related to operation of the AWTF with AOP and has been stable during the AWTF with AOP period (2019 to 2022).

Benthic invertebrate total abundance (measured by kick and sweep) in all mine-exposed areas in 2022 were similar to results from 2019 to 2021), and although higher in some cases than pre-AWTF conditions (2012 to 2015), were still within the regional normal range. The absence of an increase in abundance at the closest area to the AWTF discharge (RG_LILC3) during AWTF with AOP operations (2019 to 2022) compared to pre-AWTF conditions, suggests that marginal increases in abundance over this period further downstream were likely unrelated to the AWTF with AOP (consistent with the biomass and density results). Benthic invertebrate community endpoints indicated no adverse change in community characteristics related to AWTF with AOP operations in 2022. Rather, an increase or stability in the percentage of sensitive taxa (as measured through evaluations of percent EPT and percent Ephemeroptera) in 2019 to 2022 at some downstream areas of Line Creek relative to prior to AOP operation is suggestive of an improvement or stabilization in benthic invertebrate community structure. Overall, biological productivity downstream from the WLC AWTF does not appear to be affected by AWTF with AOP operations throughout 2022, which is consistent with past evaluations during this operational period (2019 to 2021).

4 SELENIUM CONCENTRATIONS

4.1 Overview

Monitoring data were evaluated in this section to address Study Question #2: Are tissue selenium concentrations reduced downstream from the WLC AWTF? To address this study question, selenium concentrations in benthic invertebrate tissue were evaluated in relation to the AWTF operational status. The AWTF with AOP was operational throughout 2022 with discharge to the receiving environment occurring throughout the year (see Section 1.3 for details).

4.2 Tissue Selenium Concentrations

4.2.1 Composite-Taxa Benthic Invertebrate Samples

Benthic invertebrate tissue selenium concentrations at mine-exposed areas downstream of the AWTF (RG_LILC3 and RG_LIDSL) throughout 2022 were significantly lower than during AWTF without AOP (2016 and 2017) and significantly lower than or similar to before AWTF operation (2012), when compared to changes at the reference areas over the same time frame (Figure 4.1; Appendix Figures D.1 and D.2, Appendix Tables D.1, D.2 and D.3). Changes in benthic invertebrate selenium concentrations at each RG_LILC3 and RG_LIDSL were compared to changes at the reference areas within 2022, to evaluate AWTF with AOP performance and better understand how seasonality influences benthic invertebrate tissue selenium concentrations (Appendix Tables D.4 and D.5). There were no significant differences among sampling months at RG_LILC3 in 2022; at RG_LIDSL, significantly lower tissue selenium concentrations were observed in May compared to those collected in other months (Figure 4.1; Appendix Tables D.4 and D.5). Taxa composition of benthic invertebrate samples was also largely consistent throughout the year among monitoring areas (Appendix Table D.1). Changes in benthic invertebrate tissue selenium concentrations at each area were also evaluated, throughout the AWTF with AOP operational phase (i.e., January 2019 to December 2022) by comparing the same month in 2019 to 2020, 2021 and 2022 (Appendix Tables D.6 and D.7). From 2020 to 2022, RG_LILC3 and RG_LIDSL had significantly lower or not significantly different benthic invertebrate tissue selenium concentrations than the first year of AOP operation (2019; Appendix Table D.6 and D.7). Therefore, benthic invertebrate tissue selenium concentrations in Line Creek (downstream of the AWTF outfall; RG_LILC3 and RG_ LIDSL) have not increased above concentrations measured in 2019 (AWTF with AOP) and are lower than those measured during AWTF without AOP, suggesting that the AWTF with AOP is functioned as expected in 2022 and that benthic invertebrate tissue concentrations in the area are stable. Mean selenium concentrations in benthic invertebrates collected from five of the six areas downstream of the AWTF discharge in Line Creek (RG_LISP24, RG_LIDSL, RG_LIDCOM, RG_LI8 and

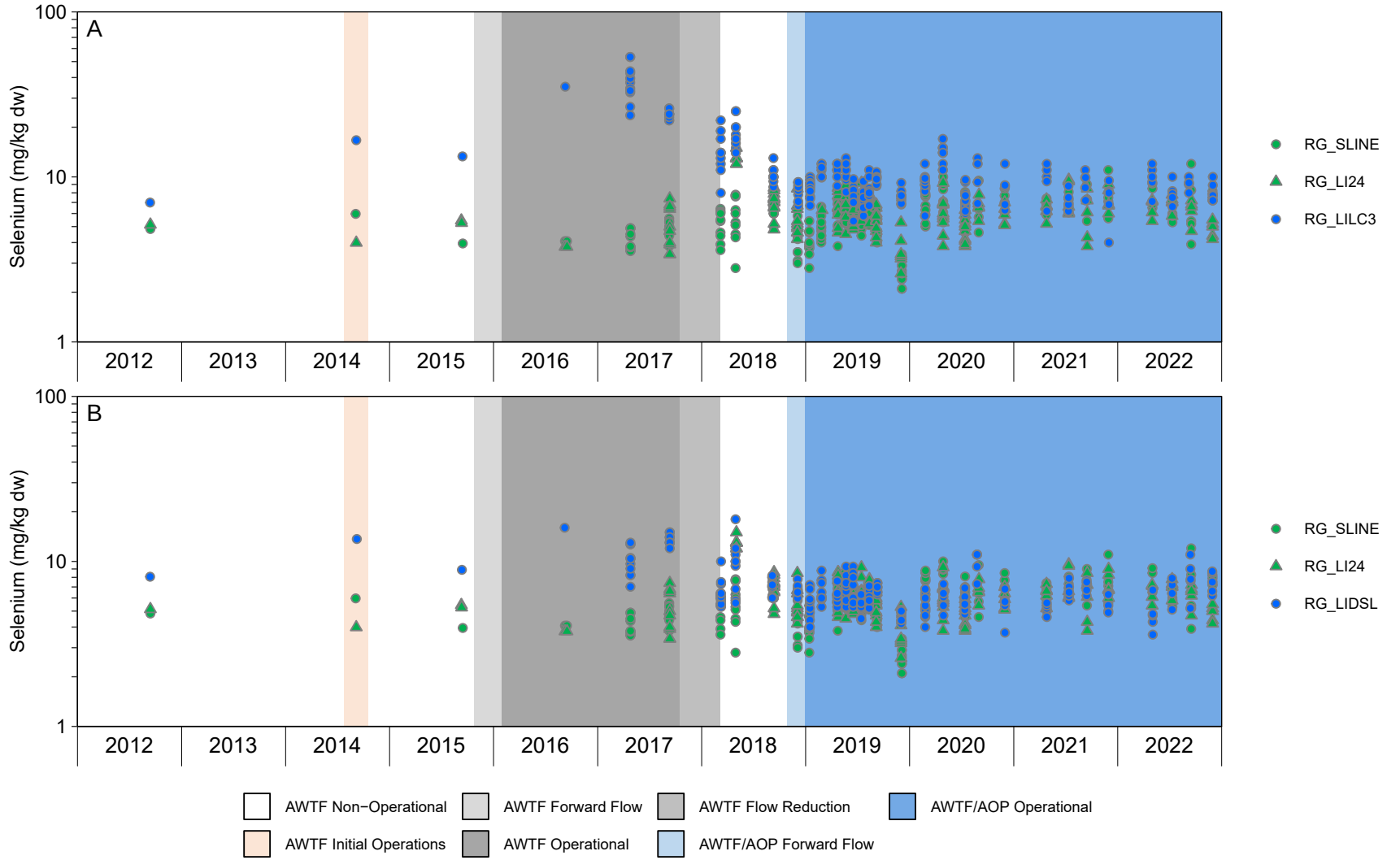

Figure 4.1: Benthic Invertebrate Selenium Concentrations, for A) RG_LILC3 and B) RG_LIDSL (Mine−exposed Areas) Relative to RG_SLINE and RG_LI24 (Reference Areas), 2012 to 2022

Notes: Blue symbols represent mine-exposed areas and green symbols represent reference areas. Due to a brief period of exposure to less−than−capacity AWTF effluent in 2014, benthic invertebrate tissue selenium data from September 2015 were not considered representative of AWTF operation, but also not representative of a no−discharge condition. These data were therefore excluded from analyses and are displayed in plots for context only. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines are displayed for each monitoring area to provide context, but pertain only to mine−exposed monitoring areas located downstream of the AWTF discharge.

RG_FO23[10]) were similar to or lower than reference and/or upstream of the discharge (RG_LCUT) throughout the 2022 sampling period (Figure 4.2, Table 4.1, Appendix Figure D.2). In addition, mean benthic invertebrate selenium concentrations at areas downstream of the AWTF in 2022 were within the regional normal range and below the Level 1 EVWQP Benchmark for effects to invertebrates (13 mg/kg dw), except concentrations at RG_LILC3 in May and September which were higher than the regional normal range (Figure 4.2, Table 4.1). The benthic invertebrate selenium concentrations at RG_LILC3 in 2022 (as well as 2019 to 2021) represent a substantial improvement relative to 2016 and 2017 (AWTF operational phase without AOP) when tissue selenium concentrations exceeded the EVWQP Level 2 and 3 benchmarks for effects to benthic invertebrates (Table 4.1; Minnow 2017a, 2018b). Results from 2022 continued to indicate (like 2019 to 2021; Minnow 2020a, 2021a, 2022) that the benthic invertebrate selenium concentrations were substantially decreased compared to AWTF operation without AOP (e.g., Minnow 2018b) and where mean concentrations were above the regional normal range (i.e., RG_LILC3 in May and Sept 2022) it was only in the area immediately downstream of the AWTF.

Selenium concentrations in benthic invertebrates from the Fording River downstream of Line Creek (RG_FO23) were similar to the Fording River upstream of Line Creek (RG_FRUL; Figure 4.3, Table 4.1). Mean benthic invertebrate selenium concentrations at RG_FRUL in July and December were higher than the regional normal range. Mean selenium concentrations in Fording River were slightly lower downstream (RG_FO23) compared to upstream of Line Creek (RG_FRUL; Figure 4.3; Appendix Table D.1). In addition, the difference in benthic invertebrate selenium concentrations between RG_FO23 and RG_FRUL in 2022 (AWTF with AOP operational phase) was similar to baseline and AWTF without AOP (Figure 4.3). One “annelid only” sample from RG_FRUL (n=5) in September 2022, measured higher (65 mg/kg dw) than the range of the composite taxa samples (Appendix Table D.1)[11]. However, analysis focuses on composite-taxa benthic invertebrate results as they better represent the area. Consistent with previous findings, the lower mean benthic invertebrate tissue selenium concentrations in the Fording River downstream of Line Creek compared to upstream, indicate there was no influence of the AWTF with AOP on benthic invertebrate tissue selenium concentrations in the Fording River in 2022 (Minnow 2018b, 2019a, 2020d, 2021a, 2022). A slight but significant increase in benthic invertebrate selenium concentrations at the South Line Creek reference area (RG_SLINE) was noted between 2017 and 2022 (Figure 4.1).

[10] Sampling at RG_LI8 and RG_FO23 was not completed during December monitoring due to safety concerns.

[11] Annelids were only included in the composite-taxa tissue sample if the proportion of annelids was >5% of the total biomass sample. An additional ‘annelids only’ sample was also evaluated. Previous assessments have suggested that the presence of annelids in composite-taxa benthic invertebrate tissue sample may bias the results high (Golder 2021b).

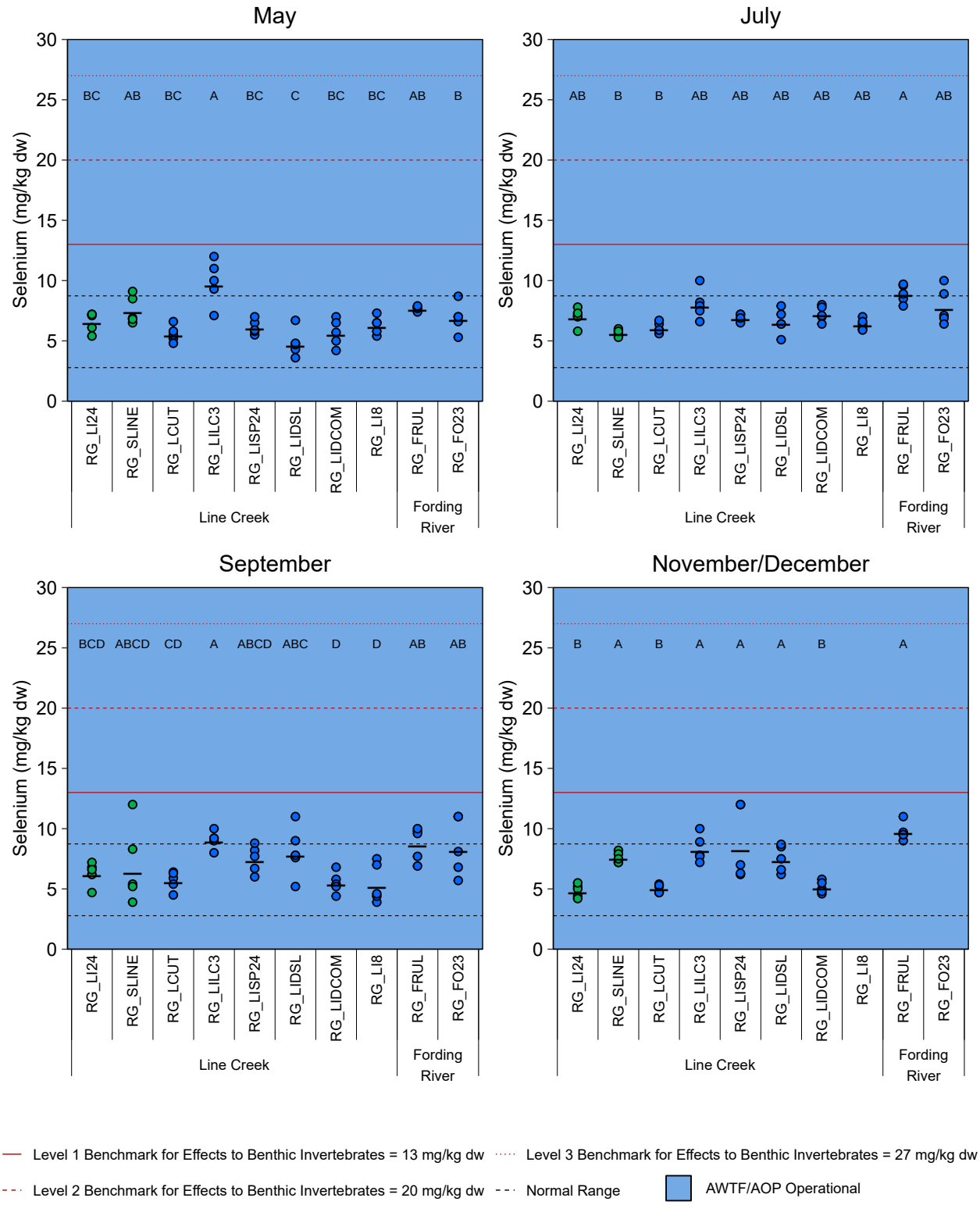

Figure 4.2: Selenium Concentrations in Composite−taxa Benthic Invertebrate Samples from Mine−exposed (Blue) and Reference (Green) Areas of Line Creek and Fording River, 2022

Notes: West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine−exposed monitoring areas downstream of the AWTF discharge. Dashed black lines represent the normal range defined as the 2.5th and 97.5th percentiles of the 1996 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP). Areas that do not share a letter (e.g. a,b,c) are significantly different (a = 0.05) in a Tukey's HSD test following a two−way ANOVA by area with Selenium log10 transformed.

Table 4.1: Mean[a] Selenium Concentrations (mg/kg dw) in Benthic Invertebrate Composite-Taxa Samples Collected from Line Creek and Fording River, Line Creek LAEMP, 2006 to 2022

Area		Biological Area Code	Biological Area Description	Prior to AWTF Operation									Initial AWTF Operation (July 24 to Oct 16, 2014	No AWTF Operation (Oct 17, 2014 to Oct 26, 2015)	AWTF Operation (Feb 1, 2016 to Oct 14, 2017)				AWTF Flow Reduction (Oct 15, 2017 to Mar 8, 2018)		AWTF Operation Suspended (Mar 9, 2018 to Oct 27, 2018)				
				2006 (August)	2009 (May/ June)	2009 (August/ September)	2010 (May)	2010 (August)	2011 (August)	2012 (September)	2013 (July)	2014 (July)	2014 (September)	2015 (September)	2016 (September)	2017 (February/ March)	2017 (April)	2017 (September)	2017 (November)	2017 (December)	2018 (March)	2018 (April)	2018 (April/May)	2018 (May)	2018 (September)
Sample Size (n)				1	1	4	3	3	1	1	1	1	1	1	1	5	10	10	10	10	10	10	10	10	10
Line Creek	Reference	RG_LI24	South fork of upper Line Creek upstream of LCO and Teck water station LC_LC1	1.4	4.4	-	-	-	-	5.1	-	-	4.0	5.3	3.8	-	-	5.2	-	-	(frozen)	-	13	-	7.0
		RG_SLINE	South Line Creek upstream of Line Creek and LCO	-	-	-	-	-	-	4.8	-	-	6.0	3.9	4.1	-	4.1	4.8	-	-	5.2	-	5.7	-	6.6
	Mine-exposed	RG_LCUT	Line Creek downstream of rock drain, downstream of West Line Creek and upstream of AWTF outfall	-	-	-	-	-	-	-	-	-	-	-	6.2	5.0	6.4	5.9	6.7	6.9	6.3	7.0	7.6	7.5	7.9
		RG_LILC3	Line Creek downstream of West Line Creek and AWTF outfall	-	-	-	-	-	-	7.0	-	-	17	13	35	27	37	24	26	27	14	19	18	15	10
		RG_LISP24	Line Creek downstream of LC_WTF_OUT, approximately 50 m downstream of contingency pond discharge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	14	13	7.4	11	10	8.9	8.2
		RG_LIDSL	Line Creek downstream of South Line Creek confluence	-	-	-	-	-	-	8.1	-	5.6	14	8.9	16	12	10	14	12	11	6.6	9.3	10	9.3	7.2
		RG_LIDCOM	Line Creek downstream of the compliance point	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.6	7.4	9.4	7.7	9.3	9.1	9.4	7.7
		RG_LI8	Line Creek downstream of the canyon	7.8	11	9.0	-	6.3[d]	8.4	7.8	4.3	-	8.4	9.3	12	8.9	8.6	11	8.3	8.9	6.9	10	12	8.6	9.0
Fording River	Mine-exposed	RG_FRUL	Fording River downstream of Grace Creek, upstream of Line Creek	-	-	-	-	-	-	7.9	-	-	-	7.5	-	-	7.0	8.1	-	-	6.9	-	8.1	-	11
		RG_FO23	Fording River downstream of Line Creek	10	5.8	8.83	5.0	5.9	8.8	7.5	11	8.8	-	6.4	6.7	-	6.6	8.9	-	-	6.4	7.9	8.7	7.6	9.4

Notes: "-" = no data. FRUL=FOUL prior to 2016. Calculation of the mean for RG_LI24 in Sept 2018 included results from both RG_LI24 and RG_DSLI24, RG_DSLI24 was sampled in Sept 2018 to investigate anomalous results at RG_LI24 reported in May 2018, but results from both areas were similar in Sept 2018, therefore data were pooled (Minnow 2019a).

[a] Means are only presented where the number of samples > 1, all other data are individual values.

[b] Sample size n = 9.

[c] Sample size n = 5.

[d] Sample size n = 1.

[e] Sample size n = 4.

[f] Sample size n = 6.

Table 4.1: Mean[a] Selenium Concentrations (mg/kg dw) in Benthic Invertebrate Composite-Taxa Samples Collected from Line Creek and Fording River, Line Creek LAEMP, 2006 to 2022

Area		Biological Area Code	Biological Area Description	AWTF/ AOP Forward Flow (Oct 28 to Dec 29, 2018)	AWTF/AOP Operational (December 29, 2018 to Present)													
				2018 (December)	2019 (January)	2019 (February/March)	2019 (April)	2019 (May)	2019 (June)	2019 (July)	2019 (August)	2019 (September)	2019 (December)	2020 (February)	2020 (April)	2020 (July)	2020 (August/September)	2020 (November/December)
Sample Size (n)				**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**5**	**5**
Line Creek	Reference	RG_LI24	South fork of upper Line Creek upstream of LCO and Teck water station LC_LC1	5.6	(frozen)	6.3[d]	6.8	6.7	5.4	6.6	6.8	5.4	3.7[f]	(frozen)	6.1	4.9	6.6	5.9
		RG_SLINE	South Line Creek upstream of Line Creek and LCO	4.3	4.0	4.9	5.9	5.9	6.1	5.7	6.0	5.1	2.7	7.0	7.7	6.2	6.5	7.2
	Mine-exposed	RG_LCUT	Line Creek downstream of rock drain, downstream of West Line Creek and upstream of AWTF outfall	6.5	6.1[b]	(frozen)	8.7[c]	4.0[b]	4.2	3.3	5.5	7.8	4.6	7.4	8.2	3.9	7.2	5.8
		RG_LILC3	Line Creek downstream of West Line Creek and AWTF outfall	8.2	8.5	11	11	10	7.8	7.2	8.1	9.7	7.6	9.2	14	7.4	11	9
		RG_LISP24	Line Creek downstream of LC_WTF_OUT, approximately 50 m downstream of contingency pond discharge	6.7	6.2	7.1	7.4	-	-	-	-	6.6	5.9	6.5	6.8	5.7	9.2	7.9
		RG_LIDSL	Line Creek downstream of South Line Creek confluence	6.7	5.7	6.6	6.0	7.1	6.8	5.4	6.0	7.0	4.7	5.5	5.9	5.8	9.9	5.5
		RG_LIDCOM	Line Creek downstream of the compliance point	7.4	7.0	7.7	8.0	-	-	-	-	6.5	5.3	5.7	6.6	5.2	6.4	5.5
		RG_LI8	Line Creek downstream of the canyon	7.2	5.8	6.6	7.4	6.1	6.7	6.4	6.7	6.5	4.2	5.1	6.7	5.3	10	8
Fording River	Mine-exposed	RG_FRUL	Fording River downstream of Grace Creek, upstream of Line Creek	10	7.5[c]	6.9	8.1	-	-	-	-	10	8.5	7.8	6.9	11	11	10
		RG_FO23	Fording River downstream of Line Creek	9.8	7.3	5.7[e]	7.6	-	-	-	-	8.5	6.7	5.1	8.0	7.8	7.5	7.2

Notes: "-" = no data. FRUL=FOUL prior to 2016. Calculation of the mean for RG_LI24 in Sept 2018 included results from both RG_LI24 and RG_DSLI24, RG_DSLI24 was sampled in Sept 2018 to investigate anomalous results at RG_LI24 reported in May 2018, but results from both areas were similar in Sept 2018, therefore data were pooled (Minnow 2019a).

[a] Means are only presented where the number of samples > 1, all other data are individual values.

[b] Sample size n = 9.

[c] Sample size n = 5.

[d] Sample size n = 1.

[e] Sample size n = 4.

[f] Sample size n = 6.

Table 4.1: Mean[a] Selenium Concentrations (mg/kg dw) in Benthic Invertebrate Composite-Taxa Samples Collected from Line Creek and Fording River, Line Creek LAEMP, 2006 to 2022

Area		Biological Area Code	Biological Area Description	AWTF/AOP Operational (December 29, 2018 to Present)							
				2021 (April)	2021 (July)	2021 (September)	2021 (November/December)	2022 (May)	2022 (July)	2022 (September)	2022 (November/December)
Sample Size (n)				**5**	**5**	**5**	**5**	5	5	5	5
Line Creek	Reference	RG_LI24	South fork of upper Line Creek upstream of LCO and Teck water station LC_LC1	6.4	7.5	6.0	7.4	6.6	7.0	6.3	4.9
		RG_SLINE	South Line Creek upstream of Line Creek and LCO	6.5	7.0	7.2	7.8	7.6	5.7	7.0	7.6
	Mine-exposed	RG_LCUT	Line Creek downstream of rock drain, downstream of West Line Creek and upstream of AWTF outfall	7.8	4.2	6.3	3.7	5.6	6.1	5.7	5.1
		RG_LILC3	Line Creek downstream of West Line Creek and AWTF outfall	9.7	7.1	9.3	7.3	9.9	8.0	9.1	8.3
		RG_LISP24	Line Creek downstream of LC_WTF_OUT, approximately 50 m downstream of contingency pond discharge	7.5	6.3	7.5	5.7	6.1	6.9	7.5	8.7
		RG_LIDSL	Line Creek downstream of South Line Creek confluence	5.2	6.7	7.0	5.6	4.8	6.6	8.1	7.5
		RG_LIDCOM	Line Creek downstream of the compliance point	6.5	5.7	6.9	5.2	5.7	7.3	5.5	5.1
		RG_LI8	Line Creek downstream of the canyon	6.9	7.0	8.0	6.0	6.3	6.4	5.5	-
Fording River	Mine-exposed	RG_FRUL	Fording River downstream of Grace Creek, upstream of Line Creek	6.8	9.4	9.6	7.9	7.7	8.9	8.8	9.7
		RG_FO23	Fording River downstream of Line Creek	6.3	8.4	7.0	7.1	6.9	7.9	8.5	-

Notes: "-" = no data. FRUL=FOUL prior to 2016. Calculation of the mean for RG_LI24 in Sept 2018 included results from both RG_LI24 and RG_DSLI24, RG_DSLI24 was sampled in Sept 2018 to investigate anomalous results at RG_LI24 reported in May 2018, but results from both areas were similar in Sept 2018, therefore data were pooled (Minnow 2019a).

[a] Means are only presented where the number of samples > 1, all other data are individual values.

[b] Sample size n = 9.

[c] Sample size n = 5.

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[e] Sample size n = 4.

[f] Sample size n = 6.

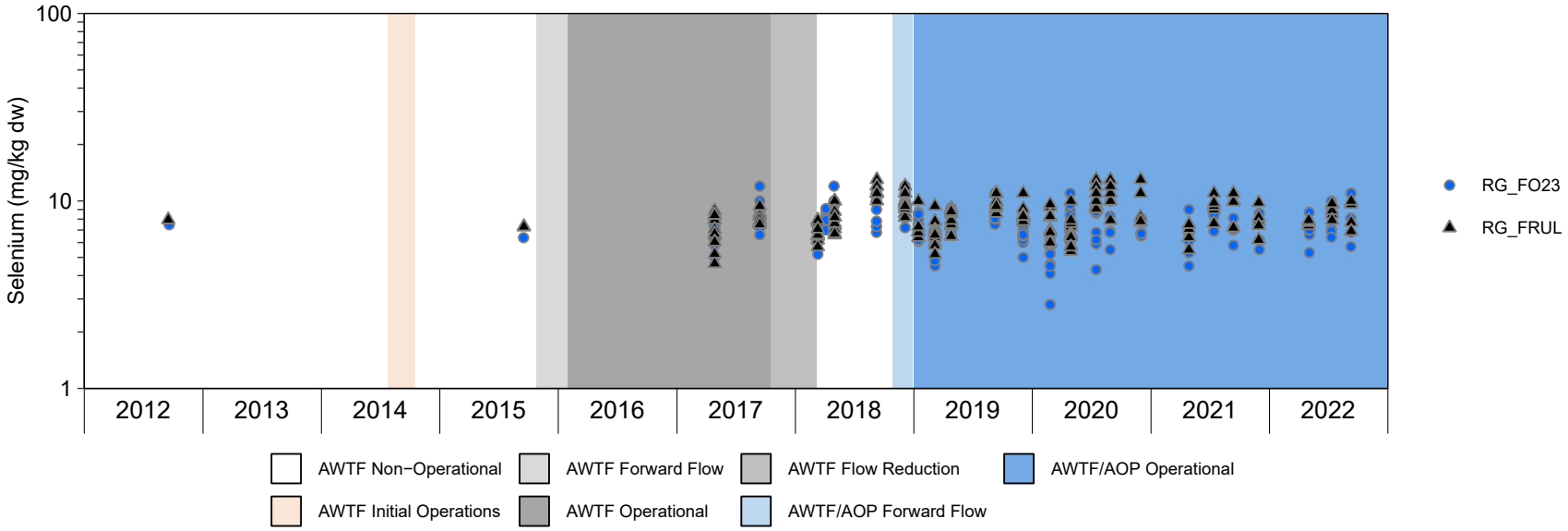

Figure 4.3: Benthic Invertebrate Selenium Concentrations, for RG_FO23 (Fording River Downstream of Line Creek) Relative to RG_FRUL (Fording River Upstream of Line Creek), 2012 to 2022

Notes: Due to a brief period of exposure to less−than−capacity AWTF effluent in 2014, benthic invertebrate tissue selenium data from September 2015 were not considered representative of AWTF operation, but also not representative of a no−discharge condition. These data were therefore excluded from analyses, and are displayed in plots for context only. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines are displayed for each monitoring area to provide context, but pertain only to mine−exposed monitoring areas located downstream of the AWTF discharge.

However, selenium concentrations at RG_SLINE in 2022 remained below the EVWQP benchmarks for effects to benthic invertebrates and largely within the normal range (Figure 4.2). Statistical evaluation indicated that the change was unlikely an artefact of a laboratory change that occurred in 2020 (see Minnow 2022 for more details) since increases were noted prior to the laboratory change (Appendix Table D.8). Additionally, the Data Quality Review (DQR) report (Appendix B) concluded excellent detectability, appropriate Laboratory Reporting Limits (LRLs), and excellent laboratory precision and accuracy for benthic invertebrate selenium measurements, all which were within the standards set out in the British Columbia Environmental Laboratory Manual (BCMOECCS 2020). There has not been mine-related operational activity in the vicinity of RG_SLINE, and stable aqueous selenium concentrations (which were below the long-term BCWQG) combined with consistently non detectable non-selenate selenium species and very low selenite (< 0.05 µg/g dw) concentrations (as discussed further in Section 4.3) at this area indicate that the increase is unlikely related to mining activities. Temporal changes in estimated dominant taxa and biomass results were not evident from 2018 to 2022 (Appendix Table D.9 and D.10), suggesting that changes in sample composition were not due to a change community structure and relative taxon biomass, but rather potentially related to variability in field sampling. Without more information it remains unclear whether temporal variability in sample composition may be related to the observed increase in benthic invertebrate selenium concentrations. Despite this, mean concentrations remain within the regional normal range and continued monitoring will continue to track further changes over time.

Selenium concentrations in benthic invertebrate tissue were also assessed against the biological trigger established for this endpoint (Appendix F). This was completed for each replicate from LCO LAEMP monitoring areas with available water quality predictions (i.e., five mine-exposed areas [RG_LCUT, RG_LILC3, RG_LIDSL, RG_LI8, and RG_FO23] and both reference areas [RG_SLINE and RG_LI24]; see Appendix F for details). Aside from one replicate at RG_SLINE (reference), replicate samples from mine-exposed and reference areas of Line Creek had selenium concentrations that were below the biological trigger. An evaluation of possible causes of the RG_SLINE results is outlined above. Further information regarding the benthic invertebrate tissue selenium biological trigger as it pertains to the LCO LAEMP can be found in Appendix F.

4.2.2 Fish

Fish tissue sampling was conducted as part of the RAEMP three-year sampling plan in 2021 (Minnow 2021c), with confirmatory sampling completed in 2022 in Line Creek. Eight WCT were caught near RG_LIDSL in September 2022.

Selenium concentrations in muscle tissue of individuals caught from RG_LIDSL in 2022 ranged from 5.2 to 18 mg/kg dw (mean of 8.3 ± 4.1 mg/kg dw), and estimated selenium concentrations in ovary tissue ranged from 8.0 to 29 mg/kg dw. Selenium concentrations exceeded the site-specific muscle benchmark and the EVWQP Level 2 benchmark for ovary tissue (15.5 mg/kg dw; Nautilus Environmental and Interior Reforestation 2011) in a single sample in 2022 (Figure 4.4; Appendix Table D.11). However, mean tissue concentrations reported for RG_LIDSL in 2022 (muscle and ovary [as estimated from muscle concentrations]) were lower than in 2021, and much lower than in 2017 (during AWTF operation without AOP; Figure 4.4; Appendix Table D.11; Golder 2014). It should be noted that resident and migratory life forms of WCT are known to exist in the Elk Valley with home ranges that can vary dramatically; individual home ranges for WCT documented near the Fording River Operation ranged from 0.7 to 31.6 km (Cope et al. 2016). As such, the selenium tissue concentrations in WCT reported for some individuals (muscle or estimated ovary) caught near RG_LIDSL could represent dietary selenium exposure from a larger area. Further information regarding fish abundance, density, and spawning as well as supporting fish habitat information for Line Creek can be found in the Lower Line Creek Fish Monitoring Program Report (Brooks et al. 2023).

Selenium concentrations in WCT muscle tissue were assessed against the biological trigger established for this endpoint (Appendix F). This was completed for each replicate from the LCO LAEMP monitoring areas with available fish tissue quality data and water quality predictions (RG_LIDSL; see Appendix F for details). One of the eight replicates at RG_LIDSL exceeded the biological trigger. Further information regarding the selenium concentrations in WCT muscle tissue biological trigger at RG_LIDSL can be found in Appendix F.

In 2022, one incidental BT mortality was sampled in the upper Line Creek area. Selenium concentrations in muscle (5.2 mg/kg dw) and in ovary (estimated concentration: 17 mg/kg dw) of this individual did not exceed site-specific benchmarks (Appendix Table D.12).

4.3 Aqueous Selenium

The AWTF with AOP was effective throughout 2022 in decreasing the aqueous total selenium concentrations downstream in Line Creek, removing a similar amount of selenium from WLC influent in 2022 (595 kg, Teck 2023) as 2021 (536 kg, Teck 2022a), 2020 (540 kg, Teck 2021b) but more than 2019 (475 kg; Teck 2020b). The decrease in aqueous total selenium concentrations in 2022 (similar to results in 2019 to 2021; Minnow 2020a, 2021a, 2022) was particularly evident at LC_LC3 during AWTF with AOP operation compared to when the AWTF was not operational (2012 to 2015 and 2018; Figure 4.5; Appendix Figure D.1). Aqueous concentrations of total selenium at the compliance point, LC_LCDSSLCC, exceeded permit limits (50 µg/L) on three instances in 2022 (Teck 2023). In 2022, aqueous total selenium

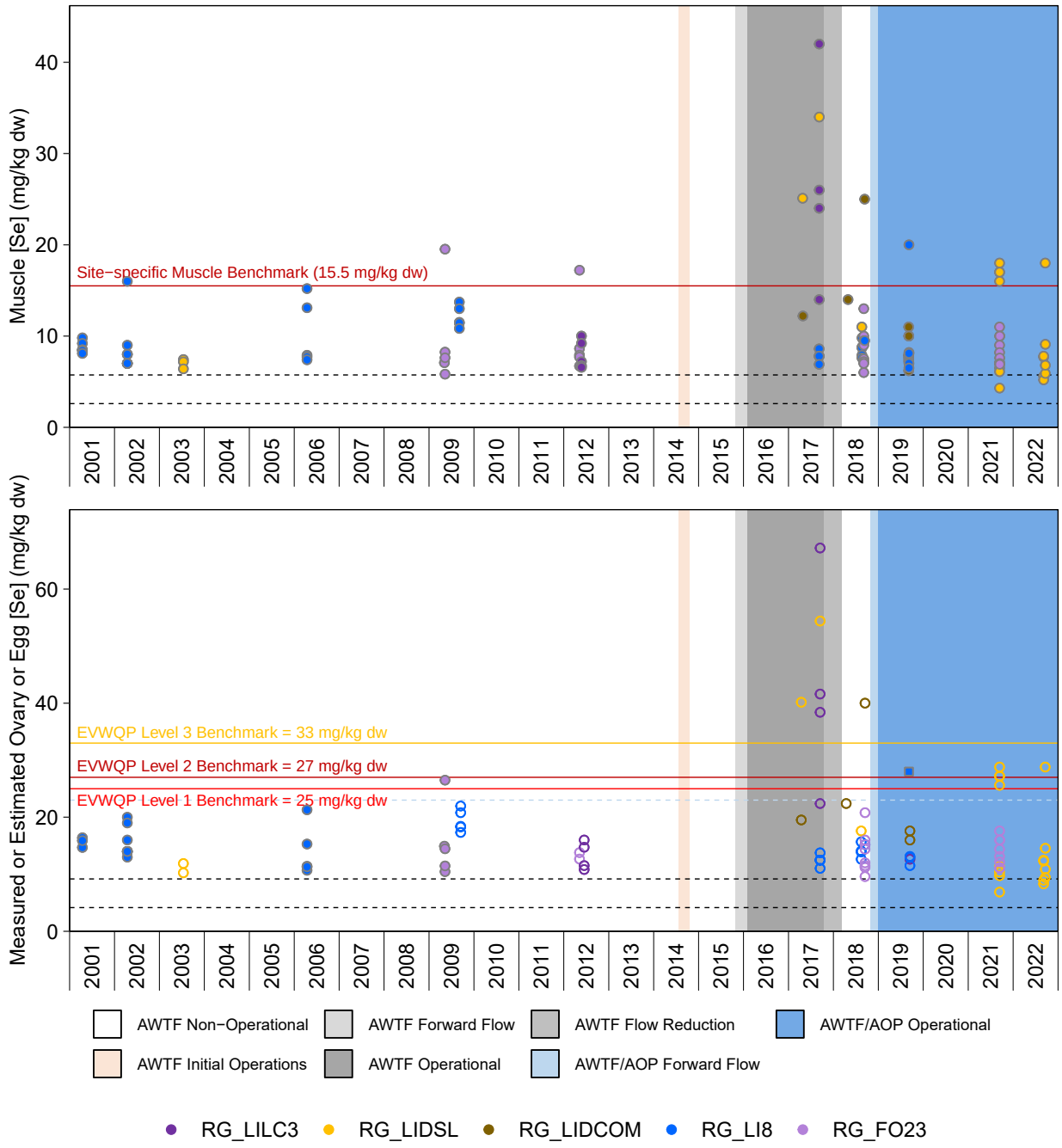

Figure 4.4: Selenium Concentrations in Muscle and Ovaries of Westslope Cutthroat Trout Sampled From Line Creek, 2001 to 2022

Notes: Measured muscle and ovary selenium concentrations are plotted as solid circles. Selenium was measured in ripe eggs collected non−lethally from one adult female in 2019, and this is plotted as a solid square. Ovary concentrations that were estimated from muscle selenium concentrations (based on the ovary−to−muscle concentration relationship of 1.6:1 presented by Nautilus and Interior Reforestation 2011) are plotted with open circles. Ovary selenium was estimated only for individuals lacking measured egg/ovary concentrations (if female). Dashed black lines represent the muscle normal range defined as the 2.5th and 97.5th percentiles of the 1998 to 2019 reference area muscle data from the Regional Aquatic Environmental Monitoring Program (RAEMP). Ovary normal range was estimated from the muscle values multiplied by the 1.6:1 conversion presented by Nautilus and Interior Reforestation 2011. The dashed blue line represents the most conservative upper prediction limit from the bioaccumulation model.

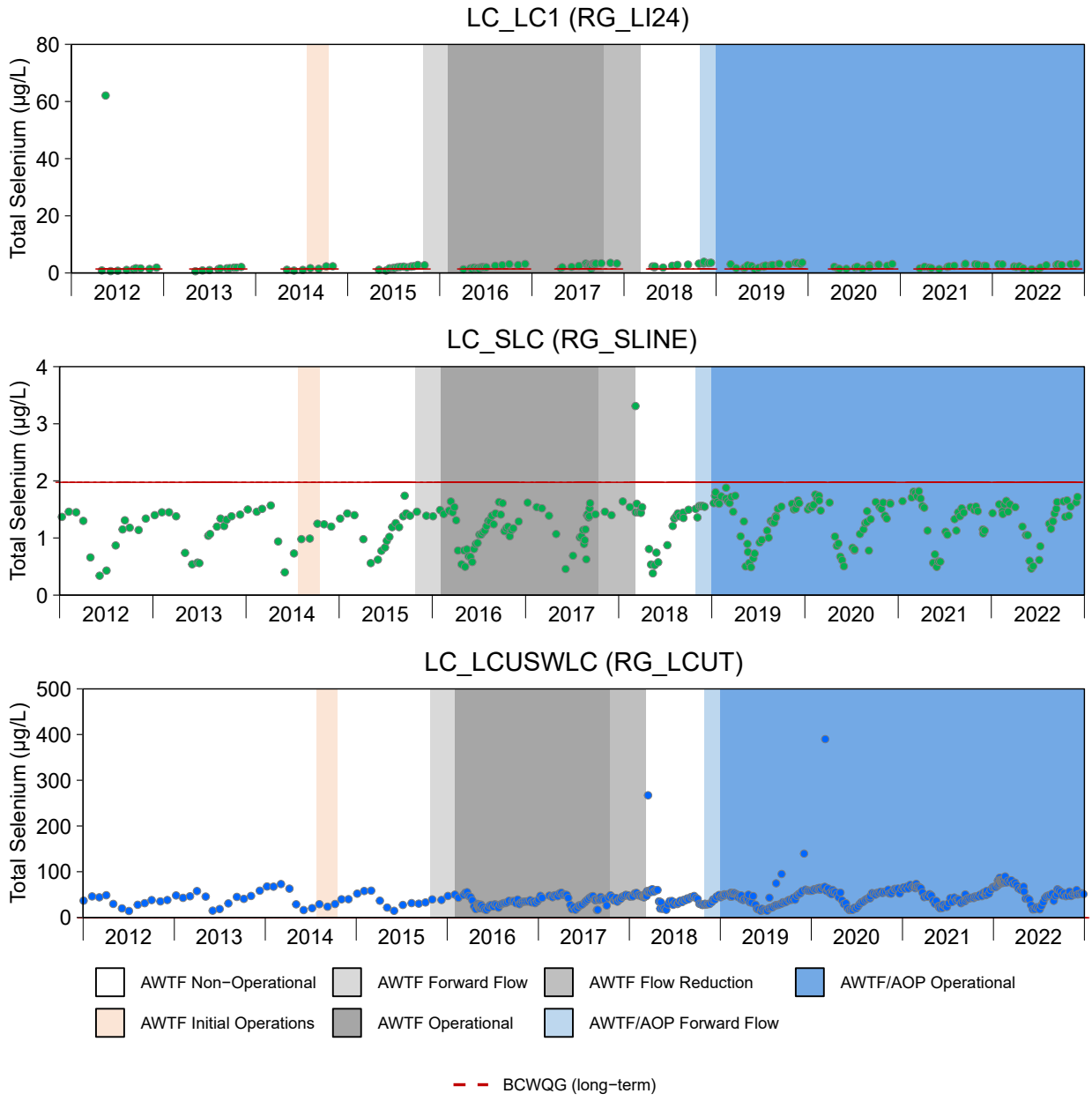

Figure 4.5: Time Series Plots for Aqueous Total Selenium Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

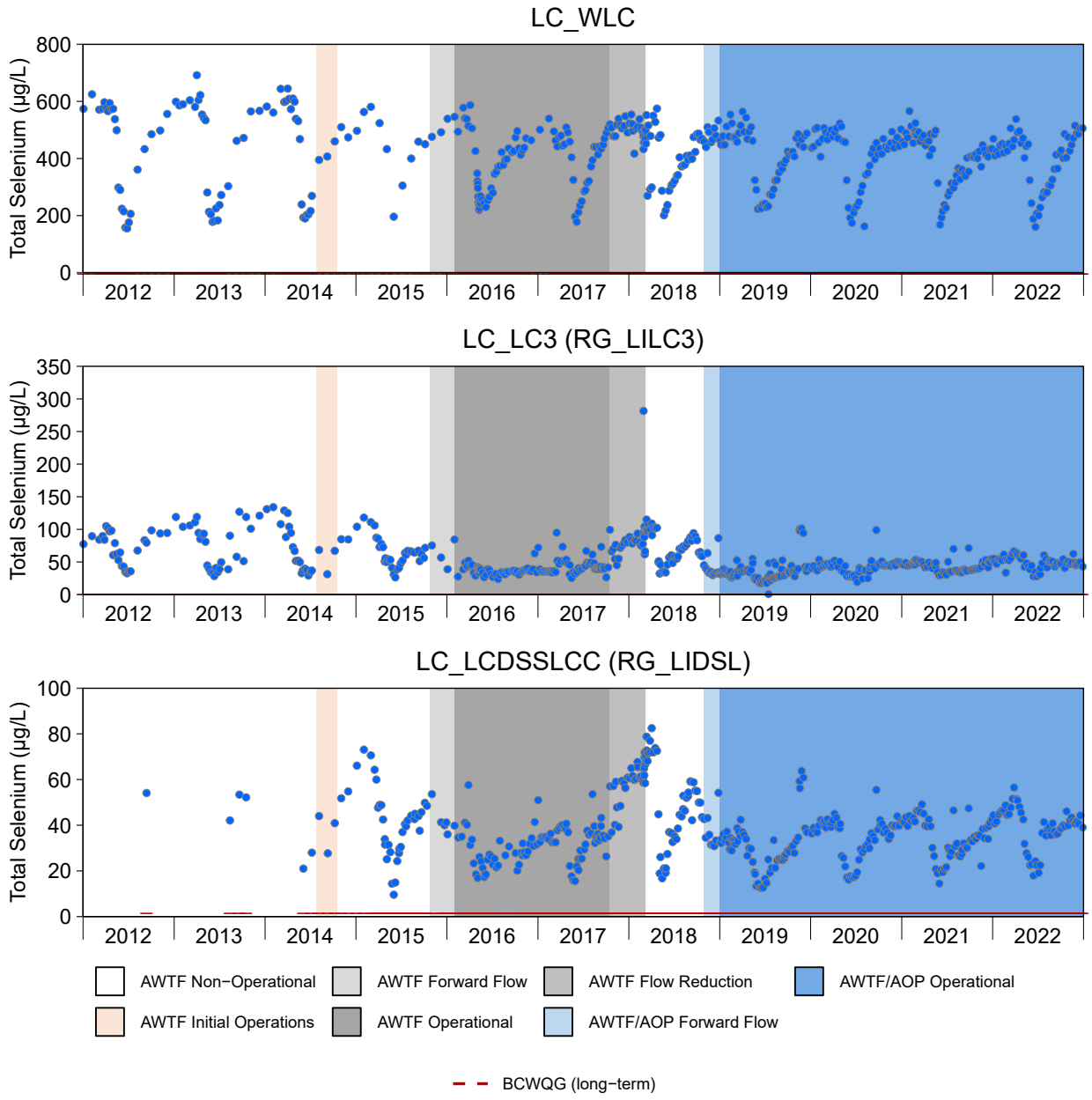

Figure 4.5: Time Series Plots for Aqueous Total Selenium Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

concentrations at mine-exposed areas were above the long-term BCWQG (2 µg/L; 100% of exposed sites) and less so at the reference areas (LC_LC1, 71% and LC_SLC, 0%; Appendix Figure D.1, Appendix Table E.2). In 2022, potential risks to aquatic life associated with selenium were assessed by evaluation of tissue selenium results in biota as compared to primarily using EVWQP benchmarks for aqueous selenium (see Section 4.2 for selenium in benthic and fish tissue discussion).

As outlined in Section 1.3, the AWTF was recommissioned with an AOP in 2018 in response to increased concentrations of chemically-reduced forms of aqueous selenium in AWTF effluent. The purpose of the recommissioning of the AWTF with an AOP was to reverse the shift in selenium species back to a selenate-dominated condition (Section 1.3). In 2022, aqueous selenium in all study areas was primarily in the oxidized form selenate (Figure 4.6; Appendix Tables D.14 and D.15). Aqueous selenium in chemically-reduced forms such as selenite or organoselenium species (i.e. dimethylseleneoxide, methaneselenonic acid, and methylseleninic acid) were present at much lower concentrations than selenate or non-detectable (Appendix Tables D.14 and D.15). Some non-selenate selenium species are known to be more readily accumulated by aquatic biota than selenate (Ogle et al. 1988; Riedel et al. 1996; Stewart et al. 2010). However, the combined total of non-selenate selenium species represents <1% of the aqueous total selenium in waters from upstream of the AWTF discharge in Line Creek (Appendix Tables D.14 and D.15). Concentrations of non-selenate species at LC_LC3 in 2022 (Figure 4.6, Appendix Figure D.2) were similar to past years of AWTF with AOP operation (2021, 2020 and 2019; Minnow 2020a, 2021a, 2022), and substantially lower than during AWTF operation without AOP in 2017 (Minnow 2018b). These results were corroborated by selenium concentrations in benthic invertebrates from downstream of the AWTF discharge in Line Creek, which were significantly lower during AWTF with AOP operation than during AWTF operation without AOP, relative to reference (see Section 4.2.1).

The Selenium Bioaccumulation Tool (B-Tool), which was developed to predict benthic invertebrate selenium tissue concentrations from aqueous selenium speciation concentration, has been used to calculate the concentrations of the combination of MeSe (IV) and DMSeO that would cause a detectable increase in benthic invertebrate tissue selenium concentrations (de Bruyn and Luoma 2021). This information was then used to develop screening levels for the sum of MeSeIV and DMSeO; Level 1 (<0.025 µg/L) where organoselenium is unlikely to cause a discernible shift in benthic invertebrate selenium concentrations, Level 2 (0.025 to 0.05 µg/L) is likely to cause a discernible increase in bioaccumulation, and Level 3 (< 0.05 µg/L) is likely to cause a discernible increase in bioaccumulation and is likely to cause exceedance of 11 mg/kg in benthic invertebrate tissue Se concentrations.

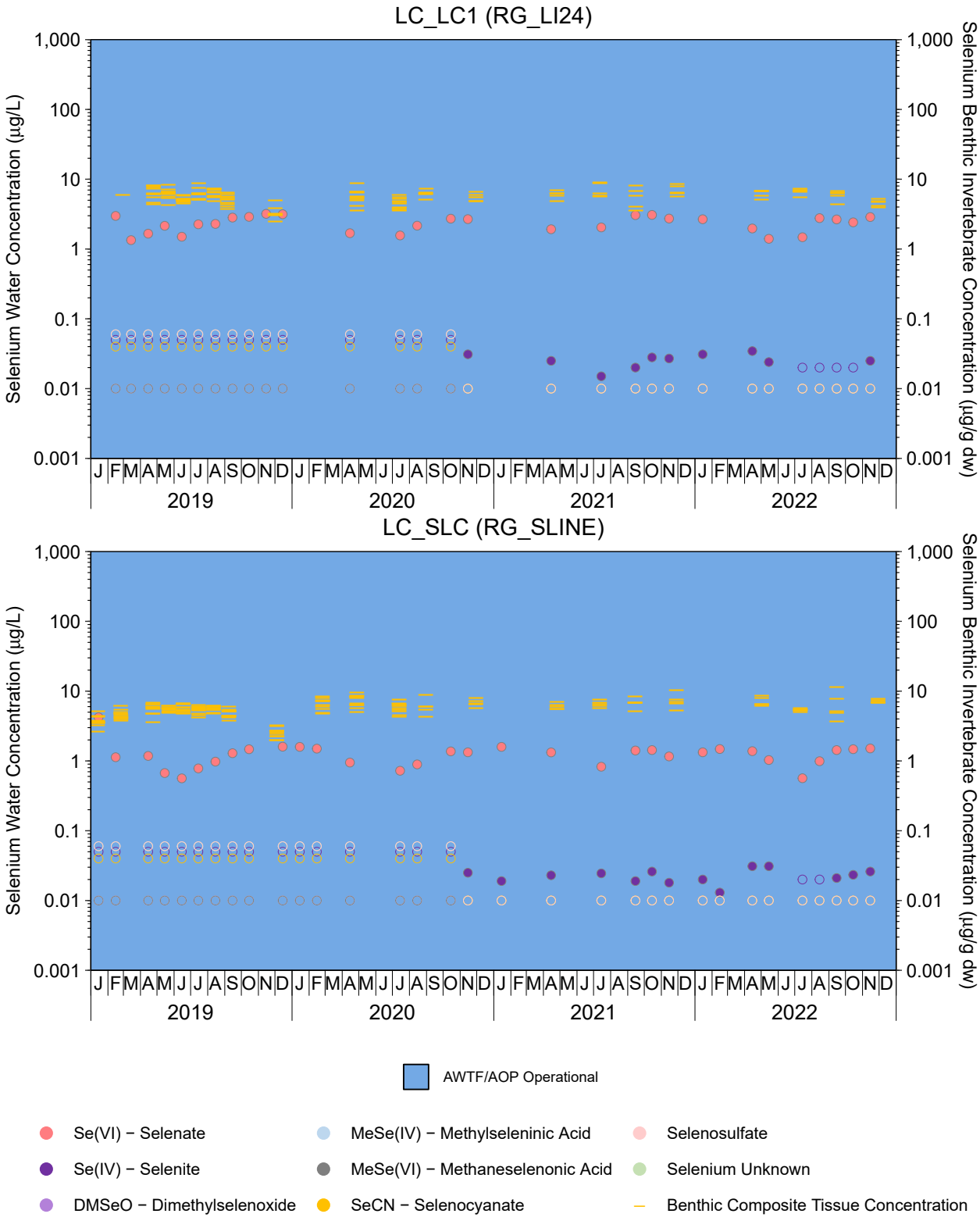

Figure 4.6: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−exposed and Reference Stations in Line Creek, LCO LAEMP, 2019 to 2022

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. Selenium species with all values at the laboratory reporting limit are excluded from the plot.

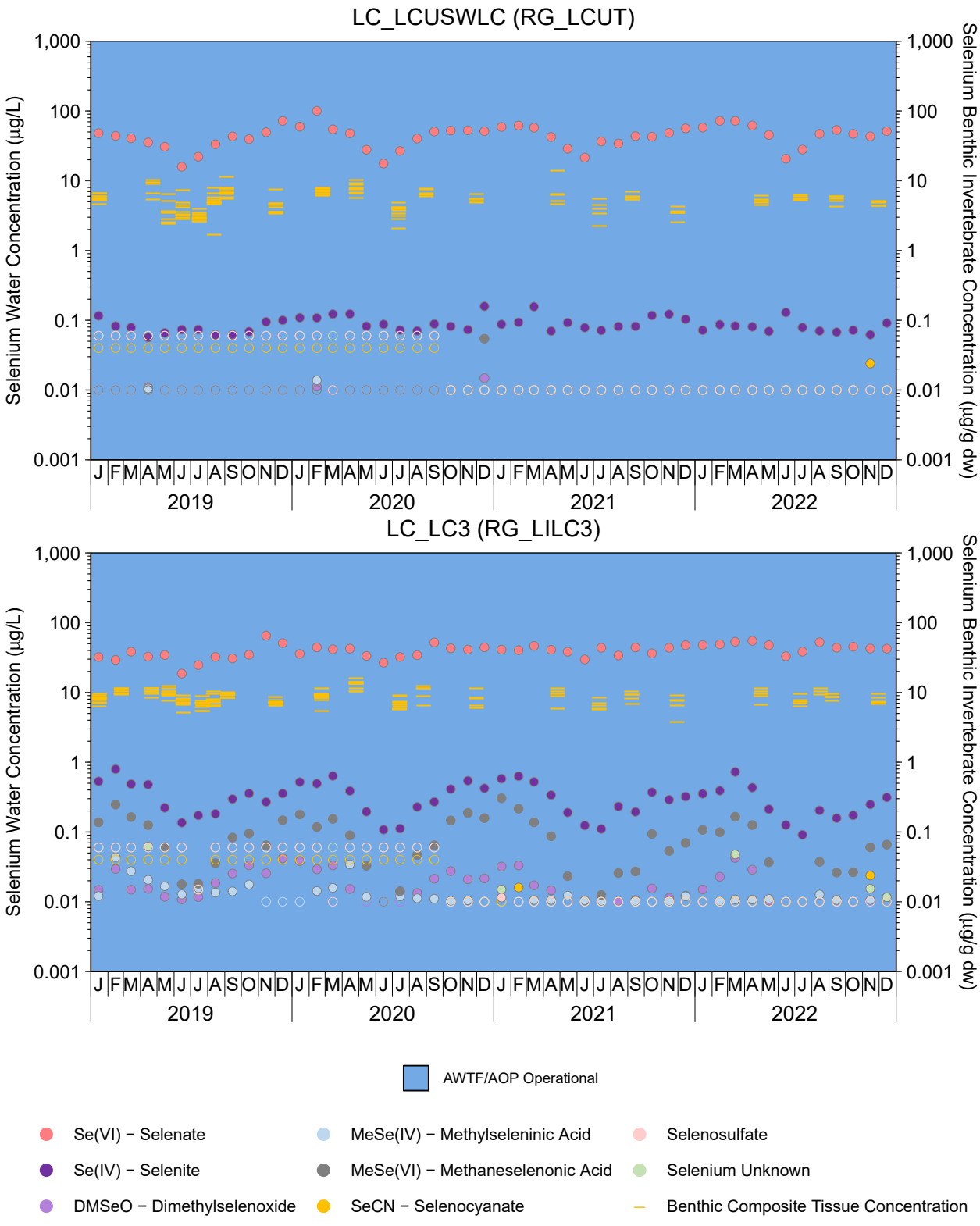

Figure 4.6: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−exposed and Reference Stations in Line Creek, LCO LAEMP, 2019 to 2022

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. Selenium species with all values at the laboratory reporting limit are excluded from the plot.

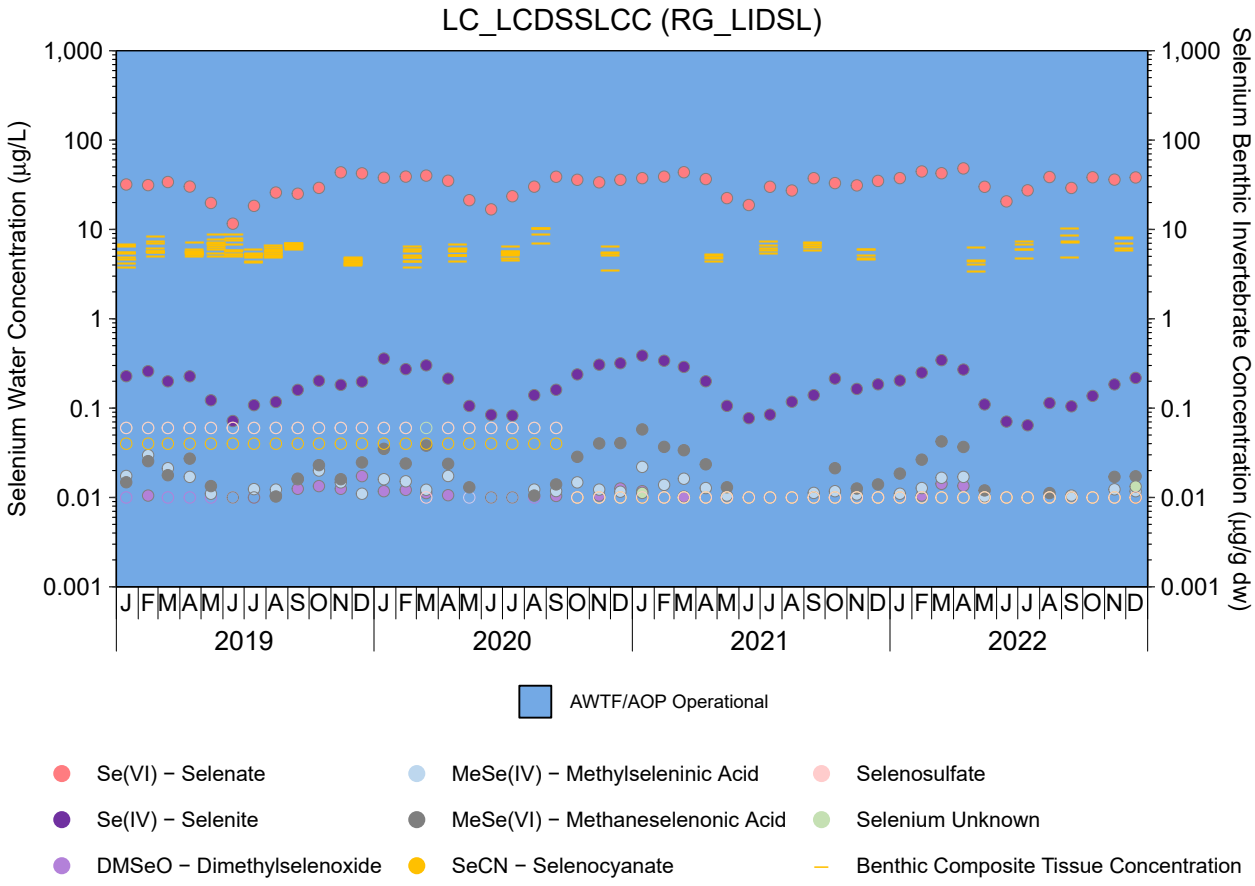

Figure 4.6: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−exposed and Reference Stations in Line Creek, LCO LAEMP, 2019 to 2022

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. Selenium species with all values at the laboratory reporting limit are excluded from the plot.

The sum of methylseleninic acid (MeSe (IV)) and dimethyl selenoxide (DMSeO) concentrations in 2022 were often above the level 2 screening value and occasionally above the level 3 screening value at RG_LIDSL and RG_LILC3 in March and early April (see Appendix Table D.15). These organoselenium concentrations at RG_LILC3 could cause exceedance of the 11 mg/kg dw EVWQP benchmark for benthic invertebrate tissue Se concentrations. The peaks in non-selenate species and organoselenium at RG_LILC3 that were observed in winter (in January to March) were followed by benthic invertebrate selenium concentrations in early May that were elevated in comparison to other sampling events in 2022 (Figures 4.7 and 4.8; see Section 4.2.1 for details). This suggests that the seasonal increase in non-selenate species observed in the winter or early spring of 2022 (and previous years) may be linked to an increase in benthic invertebrate tissue selenium at this area. The pattern of higher aqueous concentrations in winter months has also been observed for analytes that include total dissolved solids and sulphate (Appendix Figures E.1 and E.3), suggesting that the observed seasonal increases may be related to decreased baseflow in Line Creek over the winter. Regardless, benthic invertebrate tissue selenium concentrations at RG_LILC3 in early May 2022 remained similar to the South Line Creek reference area (RG_SLINE; Figure 4.2), significantly lower than during AWTF without AOP operation (relative to reference; see Section 4.2.1 for details), and lower than those observed in 2018 immediately following shutdown of the ATWF without AOP (although not tested statistically; Figure 4.8, Table 4.1).

As noted earlier, mean benthic invertebrate tissue selenium concentrations in May and September at RG_LILC3 were higher than the regional normal range. The elevated concentrations in May were associated with increased concentrations of non-selenate species in winter 2022 (January to March) as described above. However, elevated benthic tissue selenium concentrations in September 2022 did not show a similar association with elevated aqueous selenium speciation concentrations in the prior months (Figure 4.2). Despite benthic invertebrate tissue selenium concentrations higher than the normal range in May and September at RG_LILC3, mean benthic invertebrate tissue selenium concentrations at mine-exposed areas in Line Creek in 2022 (May, July, September, or December) were similar to or lower than the reference area (RG_SLINE) or were below the benchmarks for effects to benthic invertebrates (Figure 4.2). This suggests that this slight increase in mean benthic invertebrate tissue selenium concentrations over the regional normal range at RG_LILC3 in May and September 2022 may be due to natural variability. Overall, the results from 2022 continued to indicate that the AWTF with AOP functioned as intended to limit selenium accumulation by aquatic biota downstream (compared to AWTF operation without AOP).

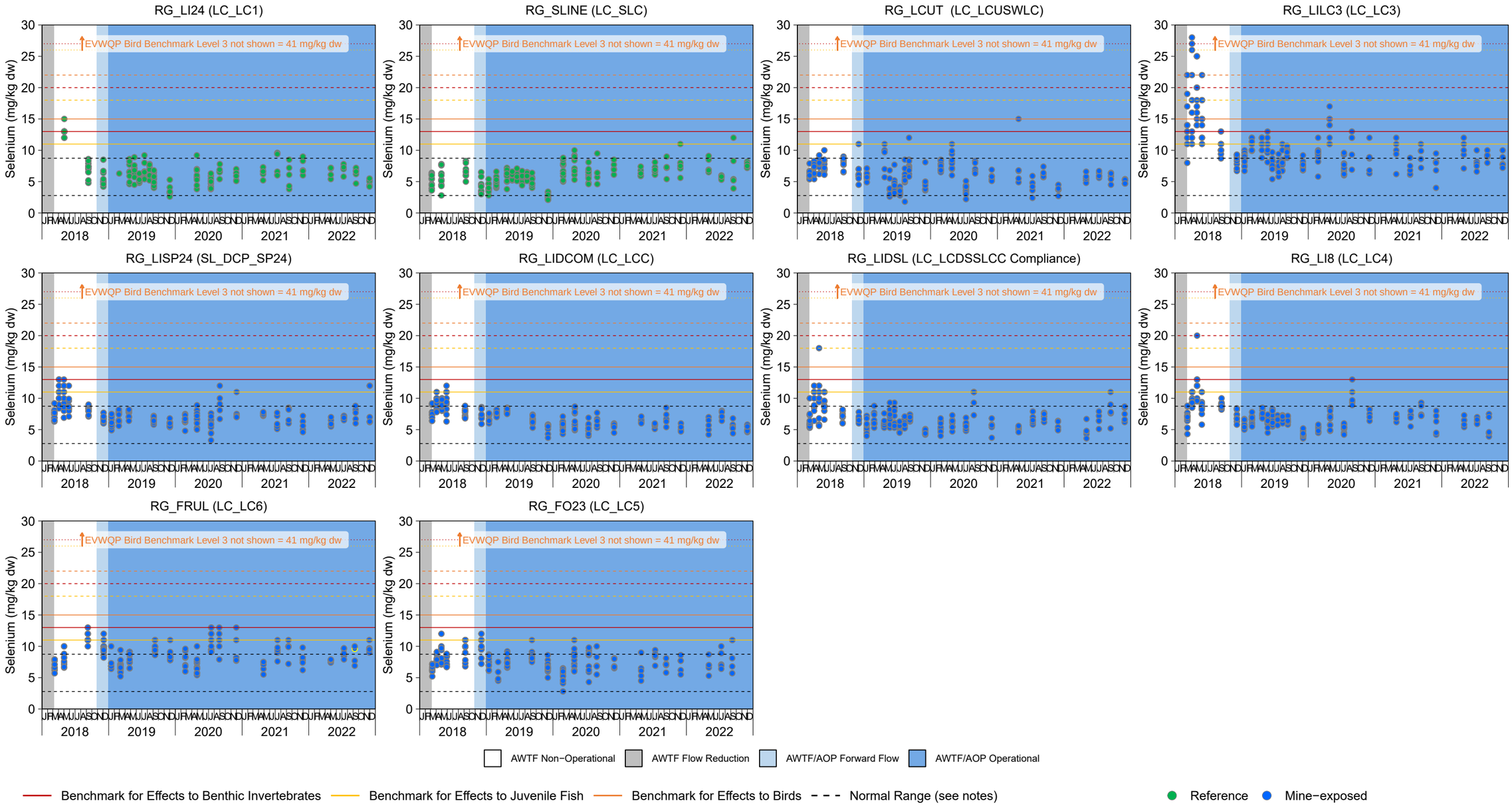

Figure 4.7: Selenium Concentrations in Benthic Invertebrate Composite−taxa Samples from Line Creek and Fording River, 2018 to 2022

Notes: Dashed black lines represent the normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP). Level 1 benchmarks are shown with a solid line, Level 2 benchmarks are shown with a dashed line, and Level 3 benchmarks are shown with a dotted line. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines are displayed for each monitoring area to provide context, but pertain only to mine−exposed monitoring areas downstream of the AWTF discharge. Samples after 2021 with an oligochaete are outlined in yellow.

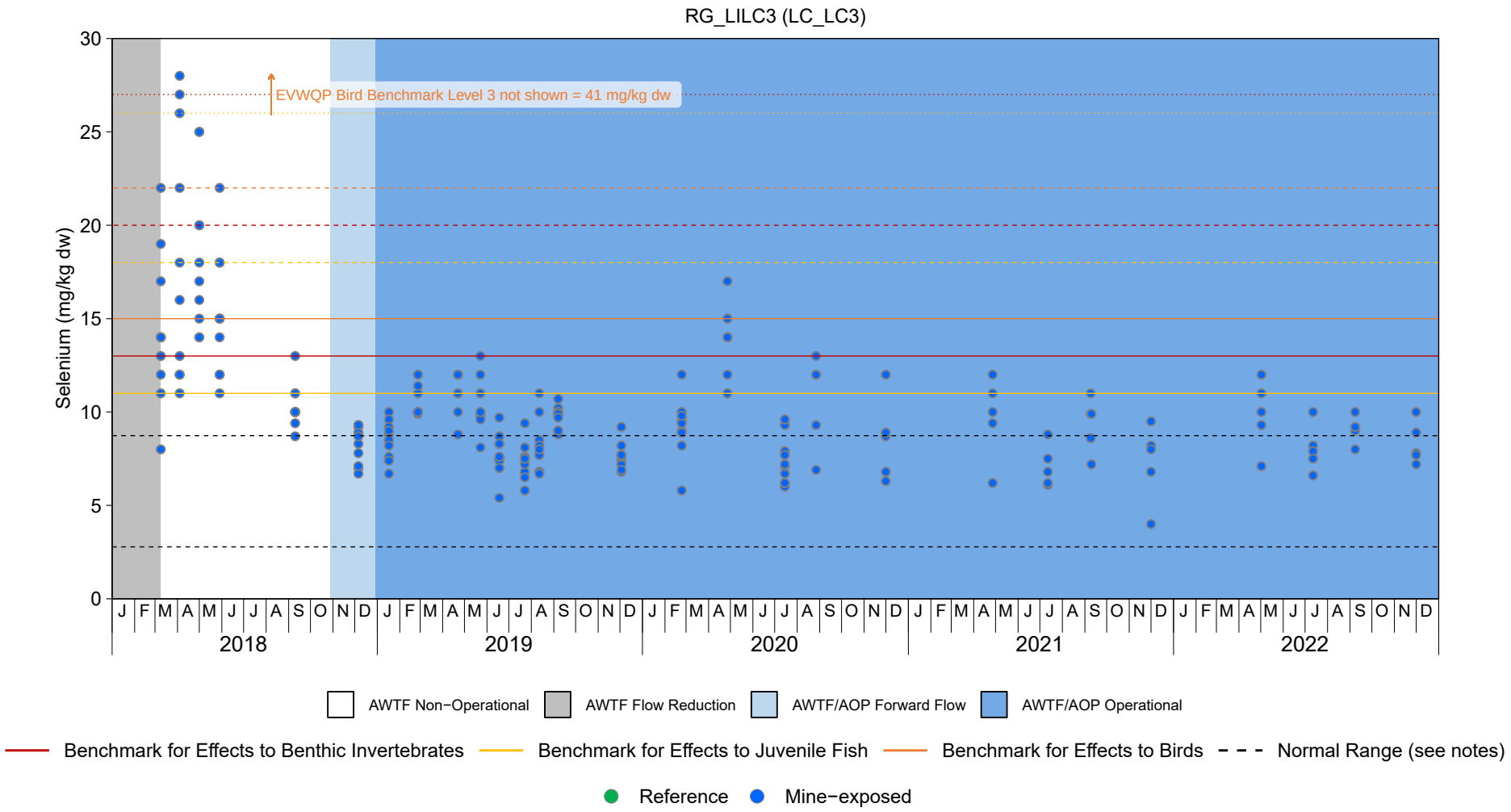

Figure 4.8: Selenium Concentrations in Benthic Invertebrate Composite−taxa Samples from Line Creek at RG_LILC3 (LC_LC3), 2018 to 2022

Notes: Dashed black lines represent the normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP). Level 1 benchmarks are shown with a solid line, Level 2 benchmarks are shown with a dashed line, and Level 3 benchmarks are shown with a dotted line. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines are displayed for each monitoring area to provide context, but pertain only to mine−exposed monitoring areas downstream of the AWTF discharge. Samples after 2021 with an oligochaete are outlined in yellow.

4.4 Bioaccumulation

Benthic invertebrate tissue selenium results from 2012 to 2022 were plotted relative to the regional one-step water-to-invertebrate lotic selenium accumulation model (Figure 4.9; Golder 2020c). The model is based on observed relationships between aqueous and benthic invertebrate tissue selenium values from samples collected previously in Line Creek and in other areas of the Elk River watershed (Golder 2020c). Plotted values in areas downstream of the AWTF discharge were within or below the 95% prediction limits of the model in 2022 (Figures 4.9 and 4.10), which is similar to the previous years of AWTF with AOP operation. This is consistent with past observations, as most plotted values have been within the model predictions, except for samples collected nearest the AWTF in 2016 and 2017 during AWTF operation without AOP (e.g., RG_LILC3 in Figure 4.10). Complete oxidation of non-selenate selenium species is not expected with the addition of AOP, however, lower selenium bioaccumulation was evident during all years of AWTF operation with AOP (2019 to 2022). Therefore, selenium accumulation in Line Creek during AWTF operation without AOP was related to higher-than-normal concentrations of non-selenate forms of selenium, and the AWTF with AOP has been functioning to decrease non-selenate forms and associated accumulation in aquatic biota.

WCT ovary tissue selenium results from 2001 to 2022[12] (measured or estimated from muscle) were plotted relative to the upper prediction interval of the regional two-step water-to-invertebrate-to-fish egg/ovary selenium bioaccumulation model (Golder 2018a). As noted earlier, fish sampling was completed at RG_LIDSL in 2022 with eight WCT muscle samples collected (Section 4.2.2). One of eight estimated ovary selenium concentrations from these samples in 2022 fell slightly above the 95% prediction limits of the selenium bioaccumulation model (the upper prediction interval of the model is shown as a blue dashed line on Figure 4.4). The majority of replicates also fell within the prediction limits in previous years of AWTF with AOP operation (except four replicates in 2021 and one replicate at RG_LI8 in 2019; Minnow 2022, 2020a). In contrast, modelled mean WCT ovary selenium concentrations in 2017 (AWTF without AOP) and 2018 (AWTF non-operational) were substantially above (up to 2.4-times) the 95% prediction limits of the model. Selenium concentration in WCT tissue at RG_LIDSL will be further evaluated spatially and temporally in the larger context of the Elk Valley as part of the RAEMP. Overall, the selenium bioaccumulation results during AWTF with AOP operation relative to the

[12] Seven fish were excluded as concurrent aqueous selenium concentrations were not available: 2001 (n=3; RG_LI8), 2003 (n=2, RG_LIDSL), 2017 (n=1; RG_LIDCOM), and 2018 [n=1; RG_LIDCOM] with concentrations ranging from 14.7 to 22.4 mg/kg dw (Figure 4.4).

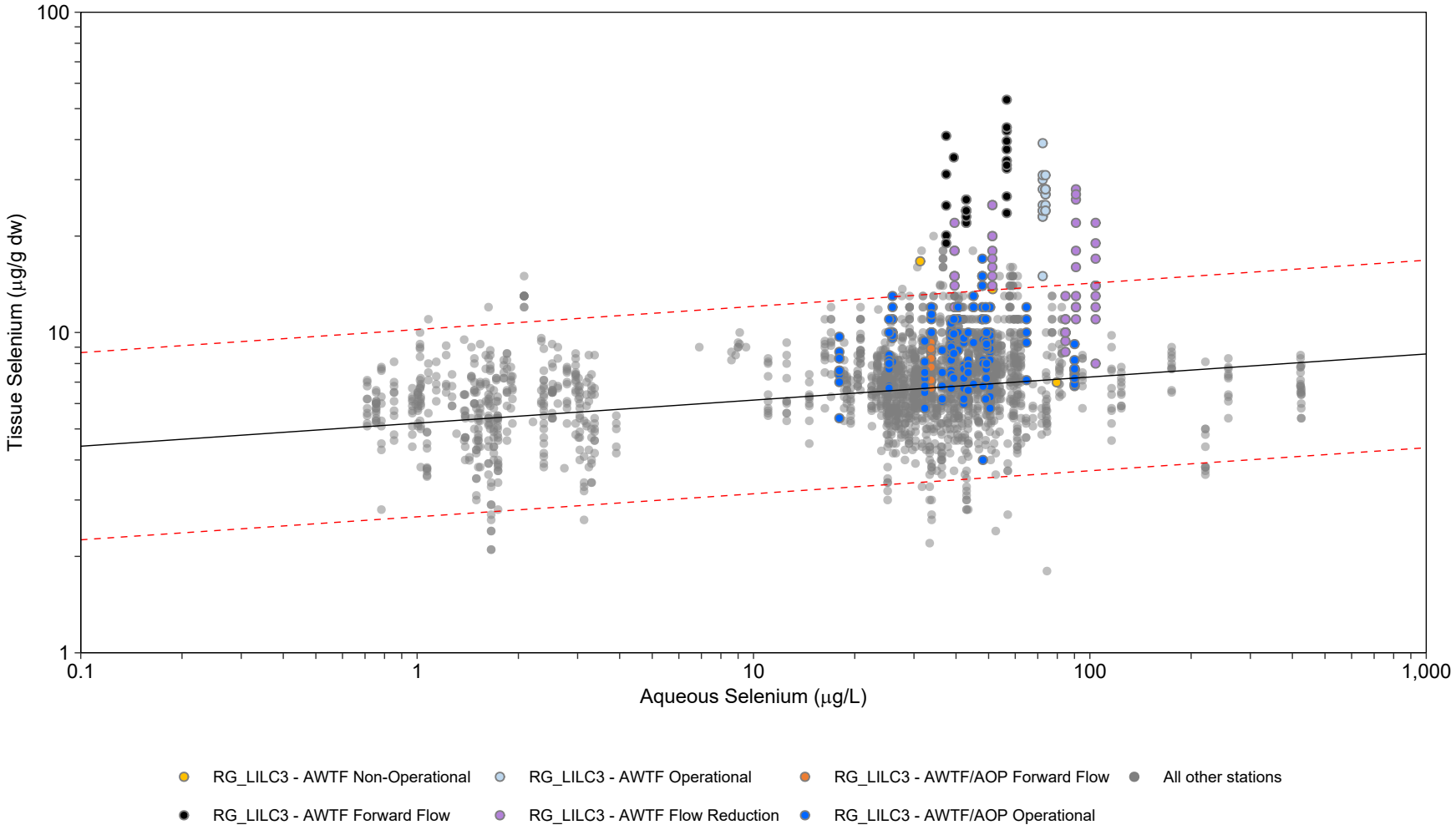

Figure 4.9: Observed and Modelled Selenium Concentrations in Benthic Invertebrate Composite Samples Relative to Total Aqueous Selenium Concentrations at Stations Upstream and Downstream of West Line Creek Active Water Treatment Facility, 2012 to 2022

Notes: Mean benthic invertebrate selenium concentrations (solid black line) were estimated using a one-step water to benthic invertebrate selenium accumulation model: $\log_{10}[Se]_{benthic\ invertebrate}=0.717+0.072 \times \log_{10}[Se]_{aq}$ (Golder 2020c). The 95% prediction limits for a single value from the one-step water to benthic invertebrate selenium accumulation model are plotted as dashed red lines. One data point for station FO23 on September 16th, 2015 is the average of two duplicate measurements.

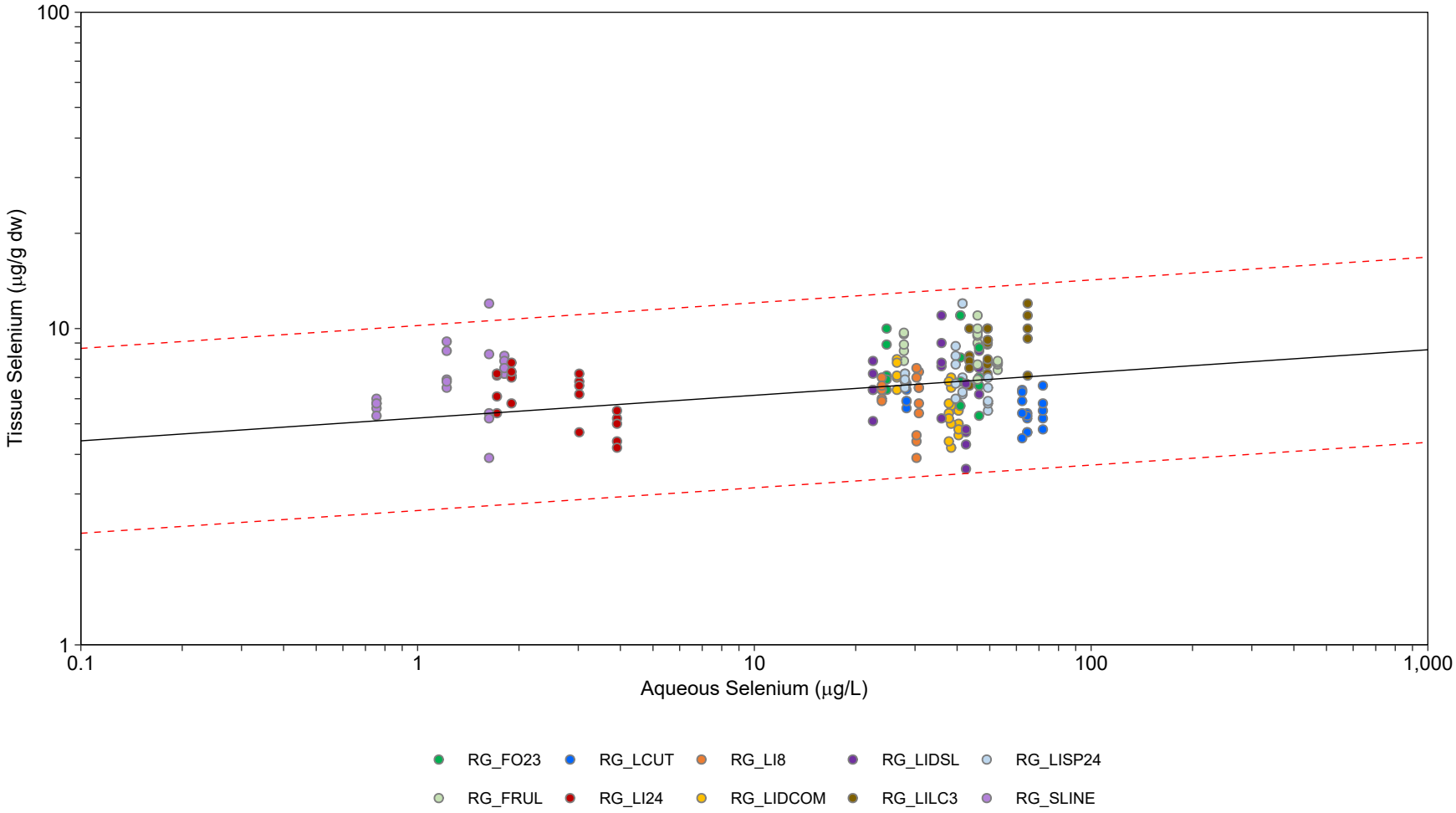

Figure 4.10: Observed and Modelled Selenium Concentrations in Benthic Invertebrate Composite Samples Relative to Total Aqueous Selenium Concentrations at Stations Upstream and Downstream of West Line Creek Active Water Treatment Facility, 2022

Notes: Mean benthic invertebrate selenium concentrations (solid black line) were estimated using a one-step water to benthic invertebrate selenium accumulation model: $\log_{10}[Se]_{benthic\ invertebrate}=0.717+0.072 \times \log_{10}[Se]_{aq}$ (Golder 2020c). The 95% prediction limits for a single value from the one-step water to benthic invertebrate selenium accumulation model are plotted as dashed red lines. One data point for station FO23 on September 16th, 2015 is the average of two duplicate measurements.

AWTF operation without AOP clearly indicate that the AWTF with AOP functioned as intended throughout 2022 to limit selenium accumulation by aquatic biota.

4.5 Summary

Concentrations of non-selenate forms of aqueous selenium in Line Creek were lower during operation of the AWTF with AOP in 2022, compared to AWTF operation without AOP (2016 and 2017) and non-operational phases (2018), which is consistent with past results from AWTF with AOP operation (2019 to 2021). Benthic invertebrate tissue monitoring in Line Creek identified lower selenium concentrations in 2022 during AWTF with AOP operations (similar to other years of AWTF with AOP operation; 2019 to 2021) compared to concentrations that were observed during AWTF without AOP operation (2016 and 2017) and non-operational AWTF phases (2018). Mean benthic invertebrate selenium concentrations were below the EVWQP Level 1 benchmark at all areas downstream of the AWTF discharge in 2022, which is similar to other years of AWTF with AOP operation. Mean benthic invertebrate selenium concentrations in areas downstream of the AWTF discharge were largely within the regional normal range (excluding two sampling events at RG_LILC3 in May and September) and all had concentrations that were similar to or lower than the South Line Creek reference area. Comparison of benthic invertebrate selenium concentrations to the selenium bioaccumulation model in areas downstream of the ATWF discharge indicated that selenium bioaccumulation in 2022 was within expectations of the model. This is similar to past results of these areas during AWTF with AOP operation (2019 to 2021). Mean tissue selenium concentrations in WCT from RG_LIDSL were mostly below the site-specific benchmarks for muscle and ovary, with one of eight fish exceeding the benchmarks. Similarly, most estimated ovary concentrations (as predicted from muscle concentrations) for WCT from RG_LIDSL in 2022 were within the prediction intervals of the ovary bioaccumulation model, except for one individual. Furthermore, WCT selenium concentrations at RG_LIDSL in 2022 (during AWTF with AOP operation) were substantially lower than those observed in 2017 (during AWTF without AOP operation). Combined, the aqueous selenium speciation and benthic invertebrate tissue selenium monitoring results all indicated that the recommissioned AWTF with AOP has been functioning as intended to shift selenium speciation in AWTF effluent from chemically-reduced species back to a selenate-dominated condition since 2019, thereby decreasing the bioavailability of selenium in Line Creek and decreasing tissue selenium concentrations downstream of the AWTF.

5 OTHER POTENTIAL INFLUENCES OF THE WLC AWTF

5.1 Overview

Monitoring data were evaluated in this section to address Study Question #3: Is WLC AWTF operation affecting aquatic biota through thermal effects, effects on dissolved oxygen concentrations, or concentrations of treatment-related constituents other than nutrients or selenium? To address this study question, water temperature and dissolved oxygen results in 2022 were evaluated upstream and downstream of the AWTF, and water quality and toxicity testing results were evaluated in relation to changes in AWTF operational status. The AWTF with AOP was operational throughout 2022 with discharge to the receiving environment occurring throughout the year (see Section 1.3 for details).

5.2 Temperature

Water temperatures were measured by continuous loggers at six locations in Line Creek in 2022. The continuous loggers were located upstream (LC Intake Pond [Data logger T1]) and downstream (LC Mixing Zone Discharge [Data logger T4], LC3 Downstream [Data logger T5]) of the AWTF, with discrete measures also documented upstream of the AWTF intake (at LC_LCUSWLC[13]; Figures 2.2 and 5.1). Water temperatures in the AWTF discharge mixing zone (downstream of the AWTF; Data logger T4) were similar to those in the AWTF intake (upstream of AWTF; Data logger T1) with the exception of slightly higher temperatures from January to April downstream of the AWTF (Figure 5.1). The AWTF intake is in a ponded area, therefore water temperatures downstream of the AWTF were also compared to a free-flowing lotic area located upstream of the AWTF intake (i.e., LC_LCUSWLC). The water temperatures in the AWTF discharge mixing zone (Data logger T4, where canopy cover is absent) were slightly higher in 2022 compared to the upstream lotic location (LC_LCUSWLC, where canopy cover is present), but the differences were not large enough to be biologically relevant and likely attributable to differences in canopy cover. Overall, the relative similarity of water temperatures measured immediately upstream and downstream of the AWTF discharge indicates that AWTF with AOP operation in 2022 did not influence water temperatures downstream (Figure 5.1).

British Columbia guidelines for water temperature are defined as a maximum ± 1º C change from the optimum temperature range for different fish life stages (BCMOE 2001). Line Creek water temperatures throughout 2022 were within, or lower than, the optimum temperature ranges specified for different life stages of BT and except for one temperature measurement at LC_LC3

[13]Temperature recordings at LC_LCUSWLC (Data logger T6) are spot measurements in 2022 as the data logger malfunctioned shortly after deployment in 2021.

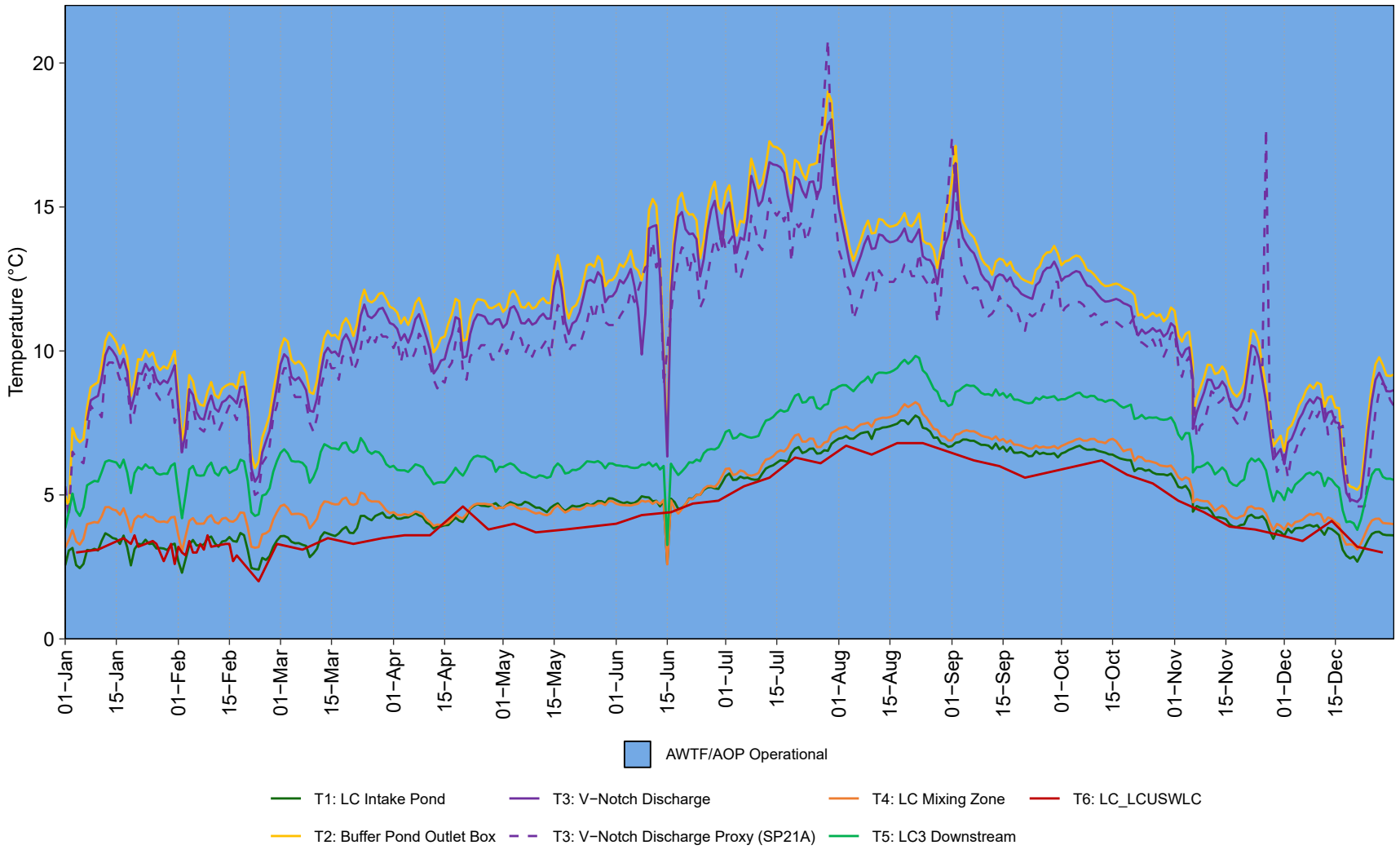

Figure 5.1: Mean Daily Water Temperature Recorded by Temperature Loggers, Line Creek LAEMP, 2022

Notes: Blue background shading indicates AWTF/AOP Restart. Values for T6: LC_LCUSWLC are spot measurements rather than daily averages due to temperature logger malfunction in early December.

in August, which exceeded the 15ºC guideline for BT alevin and rearing (Figure 5.2). It is important to note that the temperatures recorded in Figure 5.2 are from spot YSI measurements, likely in shallower riffle areas, compared to the temperature data logger measurements which are typically installed in the thalweg of the stream. Temperature data logger measurements in August at LC_LC3 did not exceed 10ºC (Figure 5.1). However, juvenile BT prefer pools and deep side channels (McPhail 2007), and the elevated temperature was limited to one riffle habitat area for one monitoring event so ultimately, the high temperature recorded at LC_LC3 in August is likely minimally affecting the amount of rearing/alevin habitat available with respect to temperature guidelines.

5.3 Dissolved Oxygen

Dissolved oxygen concentrations measured in 2022 upstream and downstream of the AWTF discharge were above most applicable guidelines (Figure 5.3; BCMOE 1997) but were occasionally below the 30-day mean criterion for the most sensitive fish life stages (buried embryo/alevin: 11 mg/L; Table 5.1). Monthly mean dissolved oxygen concentrations below this criterion (11 mg/L) occurred most frequently upstream of the AWTF discharge (LC_LCUSWLC) compared to downstream, indicating that the occurrence of dissolved oxygen concentrations below this criterion at locations downstream of the AWTF in 2022 was not related to AWTF operation.

5.4 Water Quality Analytes

Analytes with early warning triggers under the AMP and those with BCWQG, updated effects concentrations and/or water quality benchmarks were evaluated at Line Creek LAEMP monitoring stations (see Section 2.2.1; Appendix Figures E.1 to E.14, D.1 and D.2, Appendix Tables E.1 and E.2). Although some analytes had concentrations higher than applicable screening criteria (BCWQG, UECs, and/or benchmarks), exceedances of these screening criteria in 2022 were less frequent downstream of the AWTF discharge compared to upstream (LC_LCUSWLC and LC_WLC), except for nitrate. Nitrate concentrations at LC_LC3 (the area in closest proximity downstream of the AWTF outfall) exceeded the Level 2 UEC[14] in 3% of samples in 2022 whereas the Level 1 UEC was not exceeded at areas upstream of the AWTF discharge (LC_LCUSWLC and LC_WLC; see Section 3.2 for the influence of nitrate on productivity; Figure 3.4; Appendix Figure C.3, Appendix Table E.2). However, mean nitrate concentrations downstream of the AWTF (11 mg/L; LC_LC3) were lower than those upstream (15 mg/L; LC_LCUSWLC; Appendix Table E.2) indicating the AWTF in 2022 functioned as

[14] Exceedance of the Level 2 UEC an effect concentration could indicate reduction to a toxicological endpoint (e.g., growth rate, reproductive output) of approximately 20% (Golder 2022b).

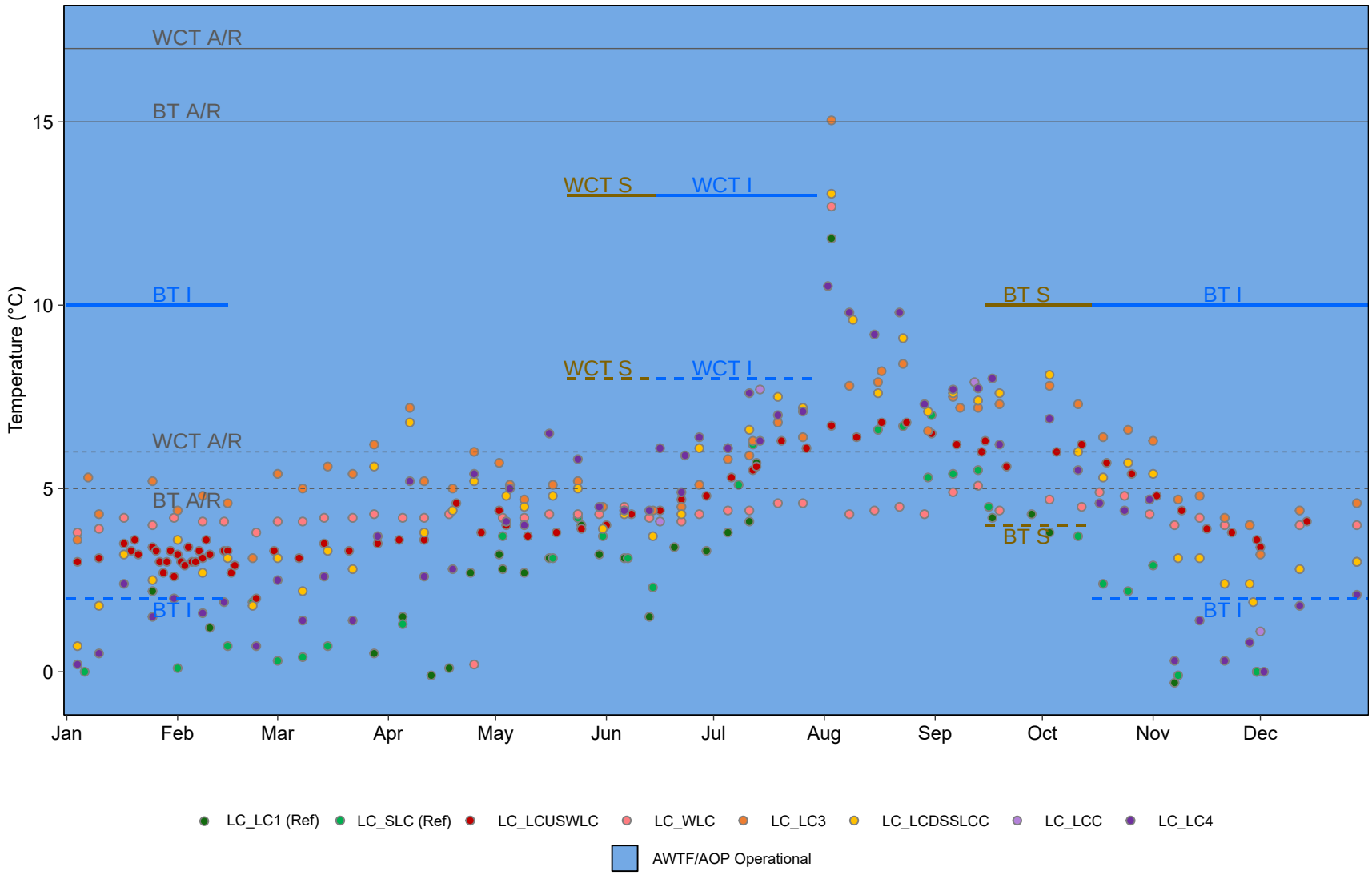

Figure 5.2: Water Temperatures at Monitoring Stations in Line Creek in 2022, Relative to BCMOE (2001b) Guidelines for Maximum (Solid Lines) and Minimum (Dotted Lines) Temperatures for Protection of Fish Species Found in Line Creek

Notes: BT = bull trout; WCT = westslope cutthroat trout; S = spawning; I = incubation; A/R = alevin/rearing. The timing of fish life history stages was approximated from COSEWIC (2016), McPhail and Baxter (1996), and McPhail (2007).

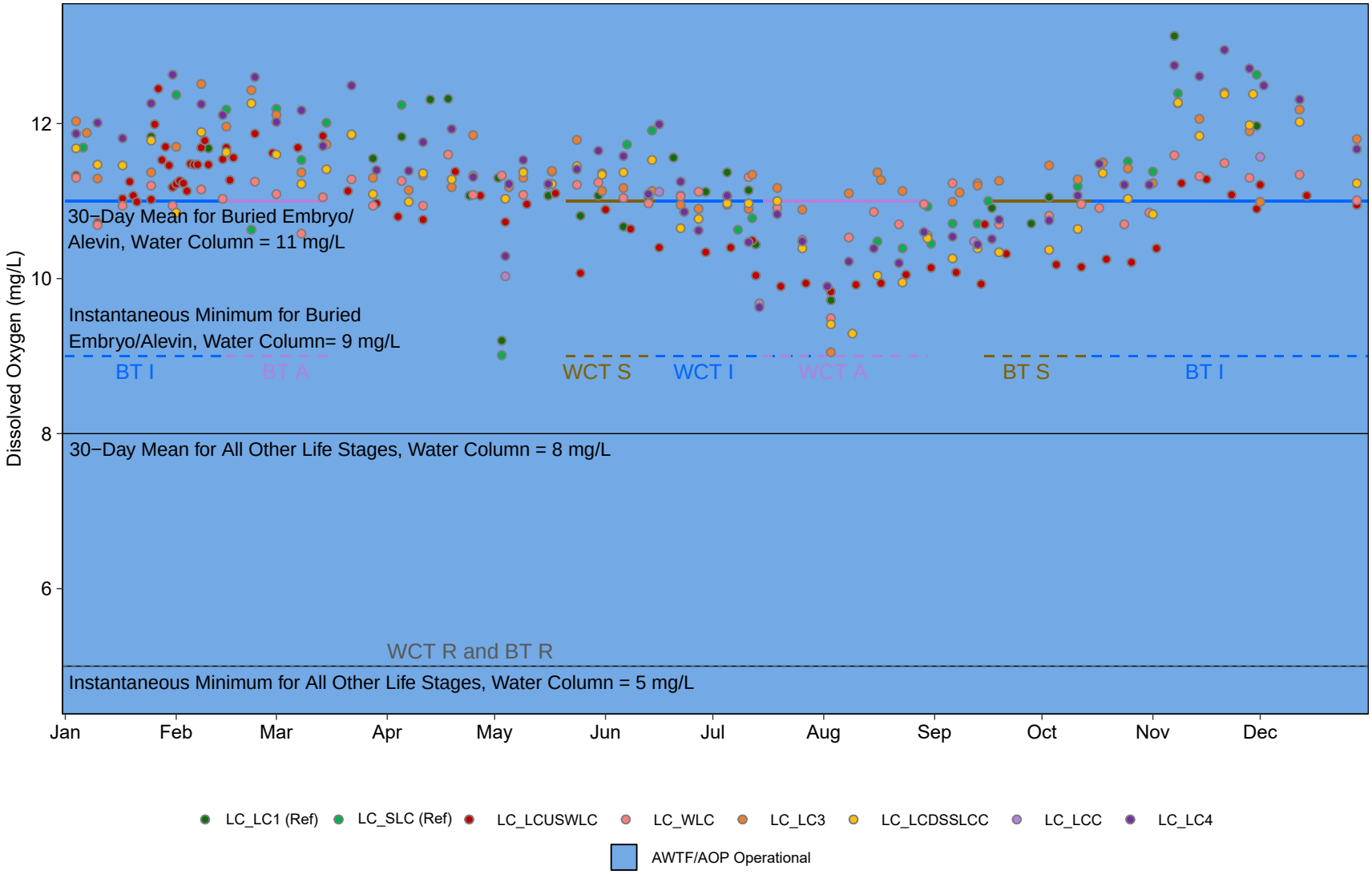

Figure 5.3: Dissolved Oxygen Concentrations at Sampling Stations in Line Creek in 2022, Relative to the BCMOE (1997) Criteria for the Protection of Fish Species Found in Line Creek

Notes: BT = bull trout; WCT = westslope cutthroat trout; S = spawning; I = incubation; A/R = alevin/rearing. The timing of fish life history stages was approximated from COSEWIC (2016), McPhail and Baxter (1996), and McPhail (2007). Spawning, incubation, and alevin stages were included in application of buried embryo/alevin guideline values.

Table 5.1: Monthly Mean Dissolved Oxygen Concentrations (mg/L) in Line Creek, 2022

Month	LC_LC1	LC_SLC	LC_LCUSWLC	LC_WLC	LC_LC3	LC_LCDSSLCC	LC_LCC	LC_LC4
January	11.8	11.7	11.4	11.0	11.6	11.6	-	12.1
February	11.7	11.7	11.5	11.1	12.2	11.7	-	12.3
March	11.6	11.9	11.4	11.0	11.7	11.4	-	12.0
April	11.9	12.2	11.0	11.2	11.4	11.2	-	11.6
May	10.8	10.8	10.7	11.2	11.4	11.3	10.0	11.2
June	11.1	11.8	10.7	11.0	11.0	11.1	11.1	11.2
July	11.0	10.7	10.2	10.9	11.1	10.8	9.7	10.5
August	9.7	10.6	10.0	10.5	10.7	9.8	-	10.3
September	10.8	10.8	10.3	11.1	11.1	10.3	10.5	10.6
October	11.1	11.4	10.2	10.8	11.4	10.9	11.2	11.1
November	12.6	12.1	11.0	11.4	12.0	11.9	-	12.8
December	-	-	11.1	11.2	11.7	11.6	11.6	12.2

Less than 30-day water column mean criterion of 11 mg/L for buried embryo/alevin life stages (guideline was applied to all months except April, see notes for details).

Notes: "-" = no data/not recorded. Spawning, incubation, and alevin stages for bull trout and westslope cutthroat trout were included in the application of buried embryo/alevin guideline values, and were applicable to at least some portion of each month except April. The timing of life history stages for these species was approximated from COSEWIC (2016), McPhail and Baxter (1996), and McPhail (2007). See Figure 5.3 for graphical display of these life history stages.

intended to decrease concentrations of nitrate downstream. Evaluation of selenium is discussed in detail in Section 4.3 and is therefore excluded here.

Three analytes (dissolved cobalt, total manganese, and total molybdenum) were previously identified (i.e., in 2021; Minnow 2022) as having higher concentrations during years of AWTF with AOP operation when compared AWTF operation without AOP or pre-AWTF. In 2022, aqueous concentrations of these three constituents at LC_LC3 were similar to or lower than in 2021 (Appendix Figures E.8, E.10, E.11) indicating that concentrations of these analytes did not continue to increase. Although mean concentrations of these three analytes in 2022 were higher downstream (at LC_LC3) than upstream of the AWTF (LC_LCUSWLC and LC_WLC), concentrations were well below the applicable long-term BCWQG (total manganese and total molybdenum; Appendix Figures E.10 and E.11, Appendix Table E.2) or within the range of pre-AWTF results (i.e., 2014 and earlier for dissolved cobalt; Appendix Figure E.8, Appendix Table E.2). The observed increase in molybdenum during AWTF with AOP operation could be related to the use of antiscalant (which contains molybdenum) which started in 2018 (pers. Comm. Traverse 2021).

5.5 Toxicity Results

Acute toxicity testing with was conducted with 28 effluent samples from WL_BFWB_OUT_SP21 using the water flea (*Daphnia magna*) and rainbow trout in 2022 (Teck 2023a). No samples failed the test criteria for acute toxicity (i.e., did not cause > 50% mortality to either organism) although one sampling event caused 10% mortality to rainbow trout and three sampling events causing 3% mortality to water flea (Table 5.2; Appendix Table E.3).

Chronic toxicity testing was performed quarterly on samples collected at LC_LC3 and the Compliance Point (LC_LCDSSLCC) to evaluate potential effects to *C. dubia* and *P. subcapitata*, while semi-annual chronic toxicity tests were conducted to evaluate potential effects to *H. azteca*, fathead minnow, and rainbow trout. Most chronic toxicity test results in 2022 were below threshold for categorization or were categorized as exhibiting no adverse response, and there was no evident pattern of multiple species exhibiting adverse responses for a given quarter and station (Table 5.3). Chronic toxicity test results in 2022 that were categorized by WSP (2023) as ‘possible’ or ‘likely’ adverse responses, and the possible causal factors of these responses, are briefly outlined below; see WSP (2023) for complete results.

Effects to reproduction of *C. dubia* (water flea) in Q3 and dry weight of *H. azteca* in Q2 were both categorized as ‘possible adverse responses’ at LC_LC3 (Table 5.3; WSP 2023). WSP (2023) indicated that “nickel was identified as potentially contributing to these observed effects in these tests.” Dissolved nickel concentrations exceeded the Proposed Level 3 Benchmark more frequently upstream (LC_LCUSWLC; 50%) than downstream of the AWTF in 2022

Table 5.2: Summary of Acute Toxicity Test Results for Line Creek Monitoring Stations, 2022 (Teck 2023)

Water Station			Water Flea *(Daphnia magna)*		Rainbow Trout *(Oncorhynchus mykiss)*	
Teck Code	**Description**	**Year**	**# Tests > 50% Mortality**	**Total # tests**	**# Tests > 50% Mortality**	**Total # tests**
WL_BFWB_OUT_SP21	West Line Creek AWTF effluent outfall	2022	0	28	0	28

Acute toxicity test failure(s) (> 50% test mortality).

Table 5.3: Results of Quarterly and Semi-Annual Chronic Toxicity Tests at LC_LCDSSLCC in 2015 to 2021 and LC_LC3 in 2019 and 2021 (Golder 2016, 2017a, 2018, 2019, 2020a, 2021a, 2022a, WSP 2023)[a]

Area	Quarter		Water Flea (*Ceriodaphnia dubia*)[b]		Amphipod (*Hyalella azteca*)[c]		Green Alga (*Pseudokirchneriella subcapitata*)	Rainbow Trout (*Oncorhynchus mykiss*)				Fathead Minnow (*Pimephales promelas*)[d]				
			Survival (% control-normalized)	Reproduction (% control-normalized; Protocol-specified)	Survival (% control-normalized)	Dry Weight (% control-normalized)	Cell Yield (x10^4 cells/ml)	Survival (% control-normalized)	Viability (% control-normalized)	Length (% control-normalized)	Wet Weight (% control-normalized)	Hatch (% control-normalized)	Survival (% control-normalized)	Biomass (% control-normalized)	Length (% control-normalized)	Normal Development (% control-normalized)
LC_LCDSSLCC	2015	Q1	100 ± 0	98 ± 14	-	-	117 ± 2.2	-	-	-	-	-	-	-	-	-
		Q2	100 ± 0	**82 ± 12**	-	-	**69.2 ± 5.7**	102 ± 3	101 ± 6	101 ± 4	101 ± 5	-	-	-	-	-
		Q3	100 ± 0	107 ± 20	-	-	83 ± 21	-	-	-	-	-	-	-	-	-
		Q4	100 ± 0	80 ± 24	-	-	94 ± 18	88 ± 9	87 ± 9	98 ± 4	103 ± 4	-	-	-	-	-
	2016	Q1	100 ± 0	109 ± 16	-	-	129.5 ± 5.3	-	-	-	-	-	-	-	-	-
		Q2	100 ± 0	**67 ± 39**	-	-	**91.0 ± 4.8**	78 ± 6	88 ± 16	104 ± 2	97 ± 12	-	-	-	-	-
		Q3	100 ± 0	83 ± 21	-	-	119.5 ± 5.5	-	-	-	-	-	-	-	-	-
		Q4	100 ± 0	94 ± 18	-	-	156.0 ± 4.5	**70 ± 10**	**69 ± 8**	104 ± 1	116 ± 11	-	-	-	-	-
	2017	Q1	100 ± 0	**92 ± 38**	-	-	211.8 ± 15.4	-	-	-	-	-	-	-	-	-
		Q2	100 ± 0	124 ± 11	-	-	134.0 ± 4.2	99 ± 8	93 ± 18	107 ± 6	125 ± 10	-	-	-	-	-
		Q3	100 ± 0	104 ± 25	-	-	146.8 ± 10.1	-	-	-	-	-	-	-	-	-
		Q4	100 ± 0	127 ± 15	-	-	103.5 ± 4.4	**41 ± 44**	**41 ± 44**	109 ± 3	119 ± 5	-	-	-	-	-
	2018	Q1	100 ± 0	75 ± 19	-	-	164.3 ± 10.3	-	-	-	-	-	-	-	-	-
		Q2	100 ± 0	***40 ± 12***	96 ± 15	108 ± 35	147.5 ± 4.8	102 ± 3	103 ± 2	104 ± 5	109 ± 16	-	-	-	-	-
		Q3	100 ± 0	106 ± 18	109 ± 10	150 ± 30	97.0 ± 12.2	-	-	-	-	-	-	-	-	-
		Q4	100 ± 35	***63 ± 23***	74 ± 30	***35 ± 20***	***87.7 ± 8.2***	100 ± 9	103 ± 11	106 ± 1	110 ± 4	-	-	-	-	-
	2019	Q1	100 ± 0	92 ± 21	-	-	81.5 ± 4.5	-	-	-	-	100 ± 0	89 ± 14	87 ± 6	***90 ± 3***	98 ± 5
		Q2	100 ± 0	81 ± 6	-	-	*110.8 ± 2.6*	101 ± 11	101 ± 15	104 ± 3	115 ± 5	-	-	-	-	-
		Q3	80 ± 42	92 ± 23	90 ± 17	*51 ± 26*	***29.8 ± 3.3***	-	-	-	-	100 ± 0	***64 ± 12***	**71 ± 8**	104 ± 5	96 ± 7
		Q4	100 ± 0	88 ± 17	**73 ± 35**	84 ± 51	***104.0 ± 10.0***	90 ± 6	86 ± 4	103 ± 2	107 ± 3	-	-	-	-	-
	2020	Q1	111 ± 0	93 ± 9	-	-	***74 ± 5.3***	-	-	-	-	98 ± 3	***39 ± 29***	**52 ± 35**	117 ± 7	112 ± 0
		Q2	90 ± 32	86 ± 34	107 ± 5	92 ± 18	**111 ± 5.6**	113 ± 18	109 ± 24	100 ± 7	103 ± 16	-	-	-	-	-
		Q3	90 ± 32	***70 ± 22***	-	-	**105 ± 9.0**	-	-	-	-	100 ± 0	96 ± 10	87 ± 6	90 ± 6	100 ± 0
		Q4	100 ± 0	74 ± 15	88 ± 17	63 ± 30	119 ± 4.4	***89 ± 8***	***87 ± 10***	102 ± 0	111 ± 8	-	-	-	-	-
	2021	Q1	100 ± 0	91 ± 27	-	-	***86 ± 3.4***	-	-	-	-	105 ± 0	104 ± 8	90 ± 9	96 ± 2	100 ± 4
		Q2	90 ± 32	87 ± 29	104 ± 5	-[e]	*55 ± 2.2*	100 ± 2	106 ± 2	106 ± 0.4	135 ± 16	-	-	-	-	-
		Q3	90 ± 32	91 ± 30	98 ± 9	*61 ± 8*	85.8 ± 5.0	-	-	-	-	102 ± 4	76 ± 18	87 ± 15	93 ± 3	104 ± 5
		Q4	100 ± 0	93 ± 21	107 ± 5	115 ± 19	***61.5 ± 7.6***	101 ± 12	100 ± 14	108 ± 5	107 ± 12	-	-	-	-	-
	2022	Q1	111 ± 0	80 ± 25	-	-	81.5 ± 5.4	-	-	-	-	100 ± 7	84 ± 8	97 ± 8	97 ± 1	100 ± 0
		Q2	100 ± 0	106 ± 30	90 ± 16	200 ± 33	***80.5 ± 5.4***	97 ± 20^M	106 ± 28^M	100 ± 5^M	98 ± 12^M	-	-	-	-	-
		Q3	100 ± 0	91 ± 22	-	-	**111.0 ± 6.2**	-	-	-	-	102 ± 0	73 ± 49	70 ± 47	98 ± 5	100 ± 0
		Q4	100 ± 0	103 ± 38	92 ± 8	81 ± 13	***54.2 ± 4.2***[f]	96 ± 12	96 ± 16	98 ± 3	101 ± 14	-	-	-	-	-

result significantly lower than at least one reference area.
Bold result significantly lower than Fording River reference (FR_UFR1).
Underline result significantly lower than Elk River reference (GH_ER2).
Italic result significantly lower than Michel Creek reference (CM_MC1).
result significantly lower than South Line Creek reference (LC_SLC).

Notes: Q_x = Calendar year quarters. "-" = no data available. Anomalously high results were observed for Q2 *H. azteca* dry weight in all reference tests. In order to adopt a conservative approach, these reference tests were excluded from normal range calculations. The reference results were included in pooled batch calculations. Q2 samples for *O. mykiss* were amended with copper concentrations of 20 µg/L for all site controls and test sites.

[a] Results presented as percent survival or endpoint ± standard deviation. Chronic toxicity testing at LC_LC3 was initiated in 2019.

[b] Two test lengths were used to evaluate potential effects *on Ceriodaphnia dubia* reproduction in 2019. These included: 1) a protocol-specified test length (i.e., reproduction was measured when ≥60 % of controls produced three or more broods; as per Environment Canada [2007c]); and 2) an 8-day test duration (Golder 2020). These two test lengths were used in 2019 to evaluate potential brood effect. Prior to 2019, the protocol-specified test length was used. Only the protocol-specified test length is presented here, see Minnow 2020a for 8-day test results.

[c] Based on the Permit 107517 and 106970 Chronic Toxicity Program integration amendment (ENV 2019), chronic toxicity testing of *Hyalella azteca* (28-day test) is required on a semi-annual basis (spring and fall; see Section 2.2.2). Collection of toxicity test samples in early 2019 (Q1) began before the amendment was issued. Therefore, toxicity testing of *H. azteca* in Q1 2019 was completed according to the previous requirements (Permit 107517). *H. azteca* testing was completed in Q3 and Q4 in 2019.

[d] Fathead minnow chronic toxicity testing (30-day early life stage test) at LC_LCDSSLC and LC_LC3 was initiated in 2019.

[e] *H. azteca* 2021 Q2 test organisms were disposed of prior to measuring dry weight due to a lab technician error, and therefore the initial Q2 tests have only survival data. In response to this, tests were repeated in Q3 for all stations (Minnow 2022).

[f] Follow-up testing was conducted in Q4 (P. subcapitata) to evaluate repeatability of original test result: 72.3 +/- 8.3; no adverse response (possible adverse response in original test).

[g] Follow-up testing was conducted in Q4 (P. subcapitata) to evaluate repeatability of original test result: 53.6+/-6.5; possible adverse response (likely adverse response in original test).

Table 5.3: Results of Quarterly and Semi-Annual Chronic Toxicity Tests at LC_LCDSSLCC in 2015 to 2021 and LC_LC3 in 2019 and 2021 (Golder 2016, 2017a, 2018, 2019, 2020a, 2021a, 2022a, WSP 2023)[a]

Area	Quarter		Water Flea (*Ceriodaphnia dubia*)[b]		Amphipod (*Hyalella azteca*)[c]		Green Alga (*Pseudokirchneriella subcapitata*)	Rainbow Trout (*Oncorhynchus mykiss*)				Fathead Minnow (*Pimephales promelas*)[d]				
			Survival (% control-normalized)	Reproduction (% control-normalized; Protocol-specified)	Survival (% control-normalized)	Dry Weight (% control-normalized)	Cell Yield (x10^4 cells/ml)	Survival (% control-normalized)	Viability (% control-normalized)	Length (% control-normalized)	Wet Weight (% control-normalized)	Hatch (% control-normalized)	Survival (% control-normalized)	Biomass (% control-normalized)	Length (% control-normalized)	Normal Development (% control-normalized)
LC_LC3	2019	Q1	100 ± 0	86 ± 12	-	-	79.5 ± 8.0	-	-	-	-	100 ± 0	86 ± 4	89 ± 4	96 ± 1	100 ± 0
		Q2	100 ± 0	85 ± 12	-	-	*113.8 ± 11.4*	92 ± 14	94 ± 13	104 ± 2	118 ± 8	-	-	-	-	-
		Q3	100 ± 0	105 ± 20	75 ± 17	67 ± 26	***27.0 ± 3.6***	-	-	-	-	100 ± 0	95 ± 13	92 ± 5	105 ± 2	100 ± 0
		Q4	90 ± 32	76 ± 22	***67 ± 45***	153 ± 25	122.8 ± 8.5	90 ± 5	83 ± 17	101 ± 3	104 ± 10	-	-	-	-	-
	2020	Q1	111 ± 0	88 ± 20	-	-	***75 ± 3.8***	-	-	-	-	100 ± 0	96 ± 7	84 ± 4	96 ± 2	100 ± 0
		Q2	100 ± 0	*87 ± 18*	*76 ± 46*	**75 ± 29**	120 ± 3.9	96 ± 29	**91 ± 33**	99 ± 8	116 ± 22	-	-	-	-	-
		Q3	100 ± 0	***82 ± 18***	-	-	***83 ± 7.4***	-	-	-	-	92 ± 6	73 ± 12	98 ± 7	104 ± 5	94 ± 13
		Q4	100 ± 0	78 ± 18	96 ± 9	49 ± 19	114 ± 5.5	**90 ± 2**	91 ± 2	101 ± 1	106 ± 12	-	-	-	-	-
	2021	Q1	90 ± 32	93 ± 40	-	-	***74.5 ± 9***	-	-	-	-	105 ± 0	104 ± 10	89 ± 6	96 ± 4	98 ± 4
		Q2	100 ± 0	99 ± 20	104 ± 5	-[e]	***47.2 ± 2.4***	98 ± 3	101 ± 6	105 ± 1	122 ± 21	-	-	-	-	-
		Q3	100 ± 0	91 ± 11	100 ± 6	*59 ± 7*	***80.8 ± 5.6***	-	-	-	-	105 ± 0	91 ± 15	102 ± 8	93 ± 7	102 ± 5
		Q4	90 ± 32	***75 ± 28***	102 ± 10	122 ± 9	***75 ± 3.4***	113 ± 4	110 ± 5	106 ± 4	104 ± 9	-	-	-	-	-
	2022	Q1	111 ± 0	86 ± 16	-	-	***51.8 ± 2.2***	-	-	-	-	95 ± 13	94 ± 8	95 ± 8	98 ± 4	100 ± 0
		Q2	100 ± 0	98 ± 32	100 ± 6	***129 ± 18***	***63.0 ± 5.3***	98 ± 6	110 ± 9	99 ± 4	96 ± 13	-	-	-	-	-
		Q3	100 ± 0	*83 ± 29*	-	-	***97.3 ± 8.5***	-	-	-	-	100 ± 4	88 ± 12	90 ± 15	102 ± 6	100 ± 0
		Q4	90 ± 32	106 ± 18	98 ± 4	77 ± 10	***50.0 ± 6.1***[g]	93 ± 12	94 ± 14	95 ± 2	95 ± 4	-	-	-	-	-

result significantly lower than at least one reference area.
Bold result significantly lower than Fording River reference (FR_UFR1).
Underline result significantly lower than Elk River reference (GH_ER2).
Italic result significantly lower than Michel Creek reference (CM_MC1).
result significantly lower than South Line Creek reference (LC_SLC).

Notes: Q_x = Calendar year quarters. "-" = no data available. Anomalously high results were observed for Q2 *H. azteca* dry weight in all reference tests. In order to adopt a conservative approach, these reference tests were excluded from normal range calculations. The reference results were included in pooled batch calculations. Q2 samples for *O. mykiss* were amended with copper concentrations of 20 µg/L for all site controls and test sites.

[a] Results presented as percent survival or endpoint ± standard deviation. Chronic toxicity testing at LC_LC3 was initiated in 2019.

[b] Two test lengths were used to evaluate potential effects *on Ceriodaphnia dubia* reproduction in 2019. These included: 1) a protocol-specified test length (i.e., reproduction was measured when ≥60 % of controls produced three or more broods; as per Environment Canada [2007c]); and 2) an 8-day test duration (Golder 2020). These two test lengths were used in 2019 to evaluate potential brood effect. Prior to 2019, the protocol-specified test length was used. Only the protocol-specified test length is presented here, see Minnow 2020a for 8-day test results.

[c] Based on the Permit 107517 and 106970 Chronic Toxicity Program integration amendment (ENV 2019), chronic toxicity testing of *Hyalella azteca* (28-day test) is required on a semi-annual basis (spring and fall; see Section 2.2.2). Collection of toxicity test samples in early 2019 (Q1) began before the amendment was issued. Therefore, toxicity testing of *H. azteca* in Q1 2019 was completed according to the previous requirements (Permit 107517). *H. azteca* testing was completed in Q3 and Q4 in 2019.

[d] Fathead minnow chronic toxicity testing (30-day early life stage test) at LC_LCDSSLC and LC_LC3 was initiated in 2019.

[e] *H. azteca* 2021 Q2 test organisms were disposed of prior to measuring dry weight due to a lab technician error, and therefore the initial Q2 tests have only survival data. In response to this, tests were repeated in Q3 for all stations (Minnow 2022).

[f] Follow-up testing was conducted in Q4 (P. subcapitata) to evaluate repeatability of original test result: 72.3 +/- 8.3; no adverse response (possible adverse response in original test).

[g] Follow-up testing was conducted in Q4 (P. subcapitata) to evaluate repeatability of original test result: 53.6+/-6.5; possible adverse response (likely adverse response in original test).

(LC_LC3; 17%; Appendix Figure E.14, Appendix Table E.2), indicating that the observed 'possible adverse responses' for *C. dubia* and *H. azteca* were likely not AWTF-related. The frequency of possible *C. dubia* and *H. azteca* responses in 2022 was not higher than in prior years (2019 to 2021; WSP 2023). In addition, WSP (2023) indicated that chronic toxicity results for LC_LC3 have "shown low frequency of adverse responses over time, and those that are observed that can only rarely be attributed to mine influence. In invertebrate tests, adverse responses have sporadically been observed, with nickel being the only constituent identified as a potential cause of responses in sublethal endpoints."

Effects to cell yield for *P. subcapitata* at LC_LC3 in Q1 and Q4 were categorized as 'likely adverse responses', and in Q2 as a 'possible adverse response'. In Q4, cell yield originally produced effects that were categorized as a 'likely adverse response', but resampling results were categorized as a 'possible adverse response' (Table 5.3; WSP 2023). Effects to cell yield at LC_LCDSSLCC in Q4 were categorized as a 'possible adverse response' and were subsequently reevaluated (similar to those from LC_LC3) and categorized as 'no adverse response' (WSP 2023). The potential cause of effect to cell yields for *P. subcapitata* at either sampling area in 2022 was unknown. The frequency of possible *P. subcapitata* responses at LC_LC3 in 2022 was slightly higher than in prior years (2019 to 2021), however the effects observed in 2019 (Q3) and 2021 (Q1 and Q4) of 2021 were either considered anomalous or were associated with elevated uncertainty (WSP 2023), limiting the applicability of temporal comparisons.

Fathead minnow (Q1 and Q3; via evaluation of hatch, survival, biomass, length, and normal development) and rainbow trout (Q2 and Q4; survival, viability, length, and wet weight) results in 2022 did not differ from reference (WSP 2023; Table 5.3).

Combined, these results indicated the toxicity responses observed in 2022 were likely not related to AWTF with AOP operation and the frequency of responses in 2022 were similar to prior years with the exception *P. subcapitata* (for which temporal comparability is limited due to test uncertainty[15]).

5.6 Summary

Operation of the AWTF with AOP in 2022 did not significantly change water temperature or dissolved oxygen concentrations downstream in Line Creek. Evaluation of water quality analytes demonstrated no increases in analyte concentrations that resulted in concentrations above guidelines or water quality benchmarks due to AWTF with AOP operation in 2022. Additionally, chronic toxicity testing at LC_LCDSSLCC and LC_LC3 suggested toxicity was

[15] The *P. subcapitata* chronic toxicity test is currently under review for potential removal from the chronic toxicity testing program due to variability and uncertainty associated with this bioassay.

similar to previous years for most endpoints. Overall, there did not appear to be influences on aquatic biota associated with the WLC AWTF with AOP operations in 2022 that were not addressed through monitoring related to Study Questions #1 (productivity) and #2 (tissue selenium accumulation), which is consistent with past evaluations during this operational period (2019 to 2021).

6 SUMMARY

Potential effects to the aquatic environment related to the commissioning of the WLC AWTF were evaluated by addressing three study questions, which focus on: 1) potential effects to biological productivity; 2) selenium concentrations in biota; and 3) potential effects related to factors other than nutrients or selenium.

Evaluation of Study Question #1 (potential influences on biological productivity) indicated that aqueous total phosphorus concentrations at the Compliance Point (LC_LCDSSLCC) were consistently below the SPO of 0.02 mg/L during 2022. In 2022, concentrations of nutrients (total phosphorus, orthophosphate, and nitrate) were generally in the ranges of concentrations observed in previous years. Additionally, the results suggested that the operation of the AWTF with AOP (2019 to 2022) was more successful at minimizing phosphorus and orthophosphate contributions to the receiving environment than operation of the AWTF without AOP (in 2016 and 2017).

Periphyton coverage at all mine-exposed and reference areas was moderate in 2022 (based on visual assessment) and was consistent with past results. Periphyton coverage at RG_LILC3 and RG_LIDCOM was moderate in 2022 (similar to results from 2017 to 2019 and 2021), and decreased from 2020, suggesting results from 2020 were an isolated event. Benthic invertebrate biomass and density at RG_LIDSL and RG_LILC3 (the two downstream areas in closest proximity to the AWTF discharge) showed no significant increase in 2022 related to operation of the AWTF with AOP. Benthic invertebrate total abundances (measured by kick and sweep) were within regional normal ranges and were largely similar to previous years (2017 to 2021) at mine-exposed areas in 2022. Benthic invertebrate community endpoints, as determined from kick and sweep sample collection, indicated no consistent adverse changes in community characteristics related to operation stabilization of the AWTF with AOP in 2022. Rather, an increased or stable percentage of sensitive taxa (Ephemeroptera and EPT) at some areas of Line Creek downstream from the AWTF (i.e., RG_LISP24, RG_LIDSL, RG_LI8 and RG_FO23) during the AWTF with AOP period (2019 to 2022) when compared to AWTF operational with no AOP (2016 and 2017) was suggestive of stability or improvement in benthic invertebrate community structure at these areas (Table 6.1).

Overall, assessment of Study Question #1 indicated that biological productivity downstream from the AWTF has not been affected by the operation of the AWTF with AOP (2019 to 2022) relative to previous years of operation.

Table 6.1: Summary of Measurement Endpoints, Analyses, and Results of Line Creek LAEMP, 2022

Study Question	Water				Biological			
	Endpoint	Indicator	Analysis/Evaluation	Result	Measurement Endpoint	Indicator	Analysis/Evaluation	Result
Is active water treatment affecting biological productivity downstream in Line Creek?	Nutrient concen -trations	Nitrate	1) Comparison to SPO 2) Comparison to BCWQG and Water Quality Updated Effects Concentrations (UECs)	1) Nitrate was below the SPO during a majority of 2022 (65% of sampling events) 2) Concentrations > BCWQG at all mine-exposed areas. Concentrations < UEC for all areas downstream of discharge, except two events at LC_LC3 > Level 2 UEC.	Periphyton productivity	Visual Coverage Scores	Coverage scored according to CABIN guidance (Environment Canada 2012)	Coverage scored as moderate at all mine-exposed areas and mild-moderate at reference stations, which was similar to results in 2021 for most areas.
					Benthic invertebrate productivity	Biomass	ANOVA analysis among years = 2014 to 2022 Areas: Ref = RG_SLINE, RG_LI24; Exp = RG_LILC3, RG_LIDSL	No adverse effect associated with AWTF with AOP operation in 2022. No significant differences in biomass at RG_LILC3 or RG_LIDSL in 2022 when compared to previous years (or when compared to previous years relative to reference).
						Density	ANOVA analysis among years = 2014 to 2022 Areas: Ref = RG_SLINE, RG_LI24; Exp = RG_LILC3, RG_LIDSL	No adverse effect associated with AWTF with AOP operation in 2022. Density at RG_LIDSL in 2022 was not significantly different than previous years or when compared to previous years relative to RG_LI24, however the difference in density at RG_LIDSL relative to the reference RG_SLINE was significantly lower in 2022 than 2014. Density at RG_LILC3 in 2022 was not significantly different than previous years or when compared to previous years relative to RG_SLINE or RG_LI24.
		Total Phosphorus	1) Comparison to SPO 2) Comparison to the LC_LC3 baseline 97.5th percentile	1) Phosphorus did not exceed SPO in 2022. 2) Concentrations in 2022 were below the LC_LC3 baseline with the exception of three samples (one in each of April, September and October).	Benthic invertebrate community structure	Abundance	Comparison to past observations and reference normal range (NR) and site-specific normal range (SNR)	No evidence of adverse effect on secondary productivity associated with AWTF with AOP operation in 2022. Organism abundance at Exp areas in 2022 were within NR, within SNR at most areas, and within range of previous AWTF operational years.
						Richness	Comparison to past observations and reference normal range (NR) and site-specific normal range (SNR)	No evidence of adverse effect associated with AWTF with AOP operation in 2022. Taxon richness at all mine-exposed areas downstream of the AWTF with AOP were within or above both NR and SNR and the range of previous AWTF operational years.
		Orthophos -phate	Comparison to the LC_LC3 baseline 97.5th percentile	Concentrations in 2022 were below the LC_LC3 baseline.		%EPT, %Ephemeroptera (%E), %Chironomidae (%C)	Comparison to past observations and reference normal range (NR) and site-specific normal range (SNR)	No evidence of adverse effect associated with AWTF with AOP operation in 2022. %EPT was within NR and SNR at RG_LIDSL and RG_LI8 but below NR and/or SNR at remaining areas downstream of AWTF discharge in Line Creek. %EPT was within or above range of previous years except at RG_LIDCOM. %EPT at RG_LIDCOM was the lowest since monitoring began in 2017 but the spatial pattern (i.e., %EPT within NR at areas closer to the AWTF discharge) is not consistent with an AWTF-related effect. %E in 2022 was within or above the range of previous years (2019 and 2021) at all areas. %E at Line Creek areas downstream of the AWTF were within NR in 2022 except for RG_LILC3 and within SNR except for RG_LILC3 and RG_LIDCOM. % E increased temporally at RG_LISP24 and RG_LIDSL during AWTF with AOP phase. %C downstream of AWTF discharge were within range of previous years or showed decreases in composition, except at RG_LIDCOM where %C increased.

Notes: AWTF = Active Water Treatment Facility; AOP = Advanced Oxidation Process; Ref = Reference sampling station/area; Exp = Mine-exposed sampling station/area; SPO = Site Performance Objective; BCWQG = British Columbia Water Quality Guideline; UEC = Updated Effects Concentration; NR and SNR = Regional normal range and site-specific normal range of reference area data, respectively from the RAEMP (see Minnow 2020b for details); Water quality benchmarks are those outlined in Teck (2014). It should be noted that the terminology used to describe the AWTF operational phase initiated on December 30, 2018 has been updated in the present report. Terminology in the 2019 LCO LAEMP report identified two AWTF operational phases after December 30, 2018: “AWTF Operational Stabilization” and “AWTF/AOP Steady State Operation” (Minnow 2020a). In the current report, after December 30, 2018 has been termed as a single “AWTF with AOP Operational” phase (see Section 1.2 for more details).

Table 6.1: Summary of Measurement Endpoints, Analyses, and Results of Line Creek LAEMP, 2022

Study Question	Water				Biological			
	Endpoint	Indicator	Analysis/Evaluation	Result	Measurement Endpoint	Indicator	Analysis/Evaluation	Result
Are tissue selenium concentrations reduced downstream from the AWTF?	Total and dissolved selenium concentrations		Visual inspection of data	Lower total [Se] downstream of the AWTF discharge during AWTF with AOP operation in 2022 compared to upstream of the AWTF and compared to AWTF operation without AOP.	Composite-taxa selenium tissue samples		1) ANOVA analysis: Before = 2012; Initial Operations = 2014; AWTF without AOP = 2016 to 2017; Shutdown = Mar to Aug 2018; AWTF with AOP Restart = Oct 2018 to Dec 2018; AWTF with AOP (2019 to 2021); Post-hoc contrasts limited to AWTF with AOP (2022) vs. AWTF without AOP and Before, within AWTF with AOP (2022), and AWTF with AOP (2019 to 2022; grouped by season). Areas: Ref = RG_SLINE, RG_LI24; Exp = RG_LCUT, RG_LILC3, RG_LISP24, RG_LIDSL, RG_LIDCOM, RG_LI8, RG_FRUL, RG_FO23 2) Spatial analysis using ANOVA during each sampling event (May 2022 to Dec 2022) 3) Comparison to reference normal range (NR) 4) Comparison to site-specific benchmarks 5) Temporal analysis (ANOVA) for RG_SLINE and visual evaluation of benthic invertebrate composite taxa samples.	1) Significant decrease in tissue [Se] during AWTF with AOP in 2022 compared to without AOP at all Exp areas downstream of the AWTF, relative to change at reference over the same period. Tissue [Se] in 2022 similar to or lower than Before period (where data available), relative to change at reference. Tissue [Se] during the AWTF with AOP period show few differences suggesting stability in conditions during this operational period. 2) Tissue [Se] downstream of AWTF discharge were similar to reference and/or upstream of AWTF (RG_LCUT) throughout 2022. 3) Mean tissue [Se] results at Exp areas of Line Creek downstream of the AWTF were within or only slightly higher than NR except for two sampling event at RG_LILC3 in May and September. 4) Average tissue [Se] downstream of AWTF discharge were below the EVWQP Level 1 Benchmark throughout 2022 5) Benthic invertebrate tissue [Se] concentration at RG_SLINE has increased since 2017, the observed increase is not believed to be due to operational activities or the laboratory change (2020), changes in benthic invertebrate taxa present in composite samples due to field sampling variability may be partially responsible for observed increase.
	Selenium speciation		Comparison downstream relative to upstream from the AWTF, and of Line Creek input to Fording River	Lower concentrations of selenite and other non-selenate species in Line Creek downstream of the AWTF discharge during AWTF with AOP relative to concentrations during operation without AOP. Concentrations of non-selenate concentrations in Line Creek downstream of the AWTF in 2022 were higher in winter (January to March) and lowest during summer (May to July). Organoselenium concentrations were above Screening Level 2 (for sum of DMSeO and MeSe(IV)) in February to early April at RG_LILC3 and March to early April at RG_LIDSL, and occasionally above Screening Level 3 in March and early April at RG_LILC3.	WCT selenium tissue samples (RG_LIDSL and RG_FO23 Only)		1) Comparison to site-specific benchmarks for muscle and estimated ovary concentrations 2) Comparison to reference normal range (NR) 3) Visual inspection of 2001 to 2022 data	1) Mean WCT muscle selenium tissue and estimated ovary selenium tissue concentrations from RG_LIDSL in 2022 were below their respective benchmarks. Of the 8 replicates collected from RG_LIDSL, 1 result exceeded their benchmarks. 2) Mean WCT muscle selenium tissue and estimated ovary selenium tissue concentrations were above the NR 3) Mean WCT muscle selenium concentrations in 2022 (in the AWTF with AOP Period) were lower than in 2021, and were substantially lower when compared to 2017 (AWTF without AOP period).
	Selenium bioaccumulation model (RG_LIDSL and RG_FO23 Only)		Comparison of composite-taxa benthic tissue selenium results to one-step water-to-invertebrate model	Tissue selenium concentrations reported during 2022 AWTF with AOP fall within the model prediction intervals with the exception of one replicate from the South Line Creek reference area (RG_SLINE).	Benthic invertebrate community structure	Abundance	Comparison to past observations and reference normal range (NR) and site-specific normal range (SNR)	No evidence of adverse effect on secondary productivity associated with AWTF with AOP operation in 2022. Organism abundance at Exp areas in 2022 were within NR, within SNR at most areas, and within range of previous AWTF operational years.
			Comparison of WCT tissue selenium results to two-step water-to-invertebrate-to-fish model	Mean WCT tissue selenium concentrations reported during 2022 at RG_LIDSL fall within the model prediction intervals except 1 of 8 replicates at RG_LIDSL. WCT tissue selenium concentrations at RG_LIDSL in 2022 (during AWTF with AOP) were lower than in 2021, and substantially lower than in 2017 (during AWTF without AOP).		Richness	Comparison to past observations and reference normal range (NR) and site-specific normal range (SNR)	No evidence of adverse effect associated with AWTF with AOP operation in 2022. Taxon richness at all mine-exposed areas downstream of the AWTF with AOP were within or above both NR and SNR and the range of previous AWTF operational years.
						%EPT, %Ephemeroptera (%E), %Chironomidae (%C)	Comparison to past observations and reference normal range (NR) and site-specific normal range (SNR)	No evidence of adverse effect associated with AWTF with AOP operation in 2022. %EPT was within NR and SNR at RG_LIDSL and RG_LI8 but below NR and/or SNR at remaining areas downstream of AWTF discharge in Line Creek. %EPT was within or above range of previous years except at RG_LIDCOM. %EPT at RG_LIDCOM was the lowest since monitoring began in 2017 but the spatial pattern (i.e., %EPT within NR at areas closer to the AWTF discharge) is not consistent with an AWTF-related effect. %E in 2022 was within or above the range of previous years (2019 and 2021) at all areas. %E at Line Creek areas downstream of the AWTF were within NR in 2022 except for RG_LILC3 and within SNR except for RG_LILC3 and RG_LIDCOM. % E increased temporally at RG_LISP24 and RG_LIDSL during AWTF with AOP phase. %C downstream of AWTF discharge were within range of previous years or showed decreases in composition, except at RG_LIDCOM where %C increased.

Notes: AWTF = Active Water Treatment Facility; AOP = Advanced Oxidation Process; Ref = Reference sampling station/area; Exp = Mine-exposed sampling station/area; SPO = Site Performance Objective; BCWQG = British Columbia Water Quality Guideline; UEC = Updated Effects Concentration; NR and SNR = Regional normal range and site-specific normal range of reference area data, respectively from the RAEMP (see Minnow 2020b for details); Water quality benchmarks are those outlined in Teck (2014). It should be noted that the terminology used to describe the AWTF operational phase initiated on December 30, 2018 has been updated in the present report. Terminology in the 2019 LCO LAEMP report identified two AWTF operational phases after December 30, 2018: "AWTF Operational Stabilization" and "AWTF/AOP Steady State Operation" (Minnow 2020a). In the current report, after December 30, 2018 has been termed as a single "AWTF with AOP Operational" phase (see Section 1.2 for more details).

Table 6.1: Summary of Measurement Endpoints, Analyses, and Results of Line Creek LAEMP, 2022

Study Question	Water				Biological			
	Endpoint	Indicator	Analysis/Evaluation	Result	Measurement Endpoint	Indicator	Analysis/Evaluation	Result
Is AWTF operation affecting aquatic biota through thermal effects, effects on dissolved oxygen concentrations or concentrations of treatment-related constituents other than nutrients or selenium?	Tempera-ture	Data loggers	Comparison downstream relative to upstream of the AWTF	No evidence that AWTF with AOP operation increased downstream temperature in 2022 when compared to upstream data loggers in similar habitat.	Benthic invertebrate community structure	Abundance	Comparison to past observations and reference normal range (NR) and site-specific normal range (SNR)	No evidence of adverse effect on secondary productivity associated with AWTF with AOP operation in 2022. Organism abundance at Exp areas in 2022 were within NR, within SNR at most areas, and within range of previous AWTF operational years.
		Routine monitoring	Comparison to BCWQG	Temperatures were within or below guideline temperature ranges for both bull trout and westslope cutthroat trout except for one measurement in August which exceeded the guideline for bull trout alevin and rearing.				
	Dissolved oxygen		Comparison to BCWQG	DO concentrations in 2022 > instantaneous minimum criterion and > 30-day average for all other life stages but < 30-day criterion for sensitive life stages (namely during summer months [July - September]). Similar trends were noted in areas both upstream and downstream of AWTF as well as reference, suggesting this was not due to AWTF with AOP operation.				
	Analytes with Early Warning Triggers		1) Comparison to past results 2) Comparison to BCWQG 3) Comparison to Water Quality Benchmarks	1) No obvious temporal increases in analyte concentrations associated with AWTF with AOP operation in 2022. Concentrations of dissolved cobalt, total manganese, total molybdenum which were identified in the 2020 and 2021 reports, were still well below benchmark values [Mn and Mo] or within the pre-AWTF range [Co]) and did not continue to increase in 2022. 2) Analyte concentations were above BCWQG less frequently downstream of the AWTF discharge than upstream, indicating no influence of AWTF with AOP operation on BCWQG exceedances. 3) EVWQP benchmarks were exceeded less frequently downstream of the AWTF discharge than upstream, indicating no influence of AWTF with AOP operation on BCWQ exceedances.		Richness	Comparison to past observations and reference normal range (NR) and site-specific normal range (SNR)	No evidence of adverse effect associated with AWTF with AOP operation in 2022. Taxon richness at all mine-exposed areas downstream of the AWTF with AOP were within or above both NR and SNR and the range of previous AWTF operational years.
	Toxicity		Comparison of acute and chronic toxicity test results to reference, and past results	No acute toxicity failed the criterion in 2022 (< 50% mortality). Majority of chronic toxicity testing results were categorized as "no adverse response" and similar to previous years. No evidence of AWTF affecting toxicity.		%EPT, %Ephemeroptera (%E), %Chironomidae (%C)	Comparison to past observations and reference normal range (NR) and site-specific normal range (SNR)	No evidence of adverse effect associated with AWTF with AOP operation in 2022. %EPT was within NR and SNR at RG_LIDSL and RG_LI8 but below NR and/or SNR at remaining areas downstream of AWTF discharge in Line Creek. %EPT was within or above range of previous years except at RG_LIDCOM. %EPT at RG_LIDCOM was the lowest since monitoring began in 2017 but the spatial pattern (i.e., %EPT within NR at areas closer to the AWTF discharge) is not consistent with an AWTF-related effect. %E in 2022 was within or above the range of previous years (2019 and 2021) at all areas. %E at Line Creek areas downstream of the AWTF were within NR in 2022 except for RG_LILC3 and within SNR except for RG_LILC3 and RG_LIDCOM. % E increased temporally at RG_LISP24 and RG_LIDSL during AWTF with AOP phase. %C downstream of AWTF discharge were within range of previous years or showed decreases in composition, except at RG_LIDCOM where %C increased.

Notes: AWTF = Active Water Treatment Facility; AOP = Advanced Oxidation Process; Ref = Reference sampling station/area; Exp = Mine-exposed sampling station/area; SPO = Site Performance Objective; BCWQG = British Columbia Water Quality Guideline; UEC = Updated Effects Concentration; NR and SNR = Regional normal range and site-specific normal range of reference area data, respectively from the RAEMP (see Minnow 2020b for details); Water quality benchmarks are those outlined in Teck (2014). It should be noted that the terminology used to describe the AWTF operational phase initiated on December 30, 2018 has been updated in the present report. Terminology in the 2019 LCO LAEMP report identified two AWTF operational phases after December 30, 2018: “AWTF Operational Stabilization” and “AWTF/AOP Steady State Operation” (Minnow 2020a). In the current report, after December 30, 2018 has been termed as a single “AWTF with AOP Operational” phase (see Section 1.2 for more details).

Evaluation of Study Question #2 (assessment of selenium concentrations) focused on aqueous selenium concentrations and selenium concentrations in biota. Aqueous selenium throughout Line Creek is primarily in the oxidized form, selenate, and chemically-reduced forms of aqueous selenium (such as selenite or organoselenium species) are present at much lower concentrations (typically <1% of the aqueous total selenium). Although the WLC AWTF without AOP successfully decreased concentrations of total selenium in Line Creek, the effluent contained higher proportions of chemically-reduced selenium species, some of which are known to be more readily accumulated than selenate by aquatic biota. The AWTF was recommissioned in 2018 with an AOP, which is designed to reverse the shift in selenium species in AWTF effluent from chemically-reduced species back to a selenate-dominated condition, thereby reducing the bioavailability of selenium in Line Creek.

Benthic invertebrate tissue monitoring in Line Creek identified substantially lower selenium concentrations throughout the operational phase with AOP (2019 to 2022) compared to concentrations during the operational phase of AWTF without AOP at all mine-exposed areas downstream of the AWTF discharge. In 2022, mean benthic invertebrate selenium concentrations were below the EVWQP Level 1 benchmark at all areas downstream of the AWTF discharge, and were largely within the regional normal range of the Elk Valley (excluding results from May and September at RG_LILC3 which were slightly higher than the normal range). Comparison of benthic invertebrate selenium concentrations to the selenium bioaccumulation model indicated that bioaccumulation in 2022 at mine-exposed areas was within model limits. This suggests that bioaccumulation was occurring as “expected” which is similar to results from other years of AWTF with AOP operation (2019 and 2021, with the exception of three samples in 2020) and is in contrast to results collected during ATWF operation without AOP. Mean selenium concentrations in WCT muscle tissue from RG_LIDSL in 2022 were below site-specific benchmarks and estimated ovary concentrations were below prediction limits of the bioaccumulation model, except one of eight replicates. Fish muscle and estimated ovary selenium concentrations at RG_LIDSL were notably lower in 2022 (during AWTF with AOP) when compared to 2017 (during operations without AOP).

Overall, assessment of Study Question #2 in 2022 (similar to other years of AWTF with AOP operation [2019 to 2021]) indicated that aqueous selenium speciation and benthic invertebrate tissue selenium monitoring results support the conclusion that the recommissioned AWTF with AOP is functioning as intended to decrease the concentrations of non-selenate species in AWTF effluent resulting in reduced selenium bioaccumulation in Line Creek.

Evaluation of Study Question #3 (potential effects related to factors other than nutrients or selenium) indicated that the operation of the AWTF with AOP in 2022 did not significantly

change water temperature or dissolved oxygen concentrations downstream in Line Creek. Evaluation of water quality analytes also demonstrated no increases in concentrations in 2022 that resulted in concentrations above guidelines or water quality benchmarks due to AWTF with AOP operation. AWTF effluent samples showed no acute toxicity test failures in 2022. Most chronic toxicity tests for LC_LCDSSLCC and at LC_LC3 resulted in no adverse responses and results were largely similar to previous years (except green algae toxicity, for which temporal comparability is limited due to test uncertainty). Adverse responses observed during chronic toxicity testing were not attributed to the WLC AWTF with AOP operation due to the absence of consistent temporal pattern of responses and/or lack of clear evidence of causal factors for observed effects that were related to AWTF operation. Overall, there did not appear to be influences on aquatic biota associated with the WLC AWTF operations throughout the AWTF with AOP operational period (2019 to 2022) that were not already being addressed through monitoring related to Study Questions #1 (productivity) and #2 (tissue selenium accumulation; Table 6.1).

The results from the Line Creek LAEMP provide information that supports Teck's Adaptive Management Plan (Teck 2021a) and Table 6.2 summarizes material presented in this report that is relevant to the AMP. Biological triggers help identify unexpected monitoring results that may lead to responses under the AMP response framework, and these indicated that four of the five mine-exposed areas evaluated had %EPT replicates which corresponded to a biological trigger (Table 6.3). Uncertainty remains around the cause of change in %EPT and this trigger will continue to be monitored as part of the RAEMP. Additionally, other efforts are also currently underway, namely predictive modeling, to resolve uncertainty around effects of mine-related stressors on benthic invertebrate community endpoints. Benthic invertebrate tissue selenium samples from mine-exposed and reference areas of Line Creek had selenium concentrations that were mostly below the biological trigger (based on projected water quality), indicating results were as expected. Selenium concentrations in WCT muscle tissue was assessed against the biological trigger for RG_LIDSL (which were sampled as part of the RAEMP), muscle tissue selenium concentrations for one of the eight replicates at RG_LIDSL exceeded the biological trigger. The selenium concentrations in WCT muscle tissue from this confirmatory investigation will be further evaluated in the larger context of the Elk Valley as part of the RAEMP to better understand both spatial and temporal trends for this biological trigger. Further information regarding the selenium concentrations in benthic invertebrate tissue and WCT muscle tissue biological trigger as it pertains to the LCO LAEMP can be found in Appendix F. Given that current biological triggers were sufficient to identify monitoring areas where biological responses are occurring, no additional triggers are recommended at this time.

Table 6.2: Summary of Findings, Responses and Adjustments Related to the LCO LAEMP in 2022

Key Question(s)	Data Evaluation Process	Outcome(s)	Responses & Adjustments in 2022	EMC Engagement
Is active water treatment affecting biological productivity downstream in Line Creek?	1. Determine if there is an increase in benthic invertebrate biomass, or shift in community structure that has been demonstrated to correspond with changes in AWTF operational status and changes in parameters associated with productivity (e.g., nutrient concentrations)	No evidence of effect on productivity associated with WLC AWTF with AOP operation in 2022.	None.	Proposed 2023 LCO LAEMP Study Design discussed by tele-conference March 15, 2023. 2023 Study Design submitted to ENV/EMC May 1, 2023. Draft data package of 2022 results and outline of proposal to transition the LCO LAEMP to the RAEMP submitted to EMC March 8, 2023, and discussed by tele-conference March 15, 2023. Written input from EMC on March draft data package and proposal to transition LCO LAEMP into the RAEMP received on March 30, 2023.
Are tissue selenium concentrations reduced downstream from the WLC AWTF?	2. Determine if there is a change in benthic invertebrate and fish tissue selenium concentrations over time that corresponds to changes in total selenium concentrations or selenium speciation in water. Benthic invertebrate community data being collected for other purposes can be used as supporting evidence of ecosystem health status downstream from the AWTF.	The WLC AWTF was recommissioned with an AOP in late 2018 in response to significantly increased concentrations of chemically-reduced aqueous selenium species and increase selenium concentrations in tissues of aquatic biota downstream of the AWTF outfall in Line Creek in 2016 and 2017. Monitoring results from 2022 indicated the recommissioned AWTF with AOP is functioning as intended to decrease aqueous concentrations of non-selenate species in AWTF effluent and reduce selenium bioaccumulation in Line Creek.	WLC AWTF was re-commissioned in August 2018 with AOP to modify chemically reduced selenium species in effluent back to a selenate-dominated condition having lower selenium bioavailability. The AWTF with AOP was operational throughout 2022 with few exceptions.	

Notes: WLC = West Line Creek; ATWF = Active Water Treatment Facility; LAEMP = Local Aquatic Effects Monitoring Program; AOP = Advanced Oxidation Process.

Table 6.2: Summary of Findings, Responses and Adjustments Related to the LCO LAEMP in 2022

Key Question(s)	Data Evaluation Process	Outcome(s)	Responses & Adjustments in 2022	EMC Engagement
Is AWTF operation affecting aquatic biota through thermal effects, effects on dissolved oxygen concentrations or concentrations of treatment-related constituents other than nutrients or selenium?	3a. Temperatures that are above/below the guideline, and dissolved oxygen concentrations that are above the threshold for effects to fish outside of the initial mixing zone, and confirmation that the mixing zone is small, will be indicative of effective management of treated water discharge. Benthic invertebrate community data being collected for other purposes can be used as supporting evidence of ecosystem health status downstream from the AWTF. 3b. Determine if there is a change in benthic invertebrate community endpoints away from the reference condition that does not correspond to observed changes in nutrients or selenium concentrations. 3c. Determine if there is a change in acute or chronic toxicity testing results that corresponds with a change in WLC AWTF operational status.	AWTF operations did not significantly influence water temperature or dissolved oxygen concentrations. Evaluation of most water quality parameters, including treatment-related constituents, demonstrated no obvious increases in concentrations during AWTF with AOP operation with a few exceptions. Dissolved cobalt, total manganese, and total molybdenum increased in relation to initiation of AWTF with AOP operations but remained well below guidelines (manganese and molybdenum) or within the range of per-AWTF conditions (dissolved cobalt) and did not continue to increase in 2022 (i.e., were lower or within the range of measurements in 2019 to 2021). Ongoing monitoring of these analytes will provide further information regarding the nature of these increases. Effluent samples showed no acute toxicity. Chronic toxicity at LC_LC3 or LCLCDSSLCC for most species was either not-significantly different from reference areas or was similar to prior years, with the exception of algae results.	None.	

Notes: WLC = West Line Creek; ATWF = Active Water Treatment Facility; LAEMP = Local Aquatic Effects Monitoring Program; AOP = Advanced Oxidation Process.

Table 6.3: Summary of Biological Trigger Analysis for Percent EPT, Selenium Benthic Invertebrate Tissue (BIT), and Selenium Westslope Cutthroat Trout (WCT) Muscle Tissue, Line Creek LAEMP, 2022

Waterbody	Area		% EPT[a]		Selenium BIT[b]		Selenium WCT Muscle Tissue[a]	
			Number Replicates Evaluated	Number of Replicates Reaching Biological Trigger[c]	Number Replicates Evaluated	Number of Replicates Reaching Biological Trigger[d]	Number Replicates Evaluated	Number of Replicates Reaching Biological Trigger[e]
Line Creek	RG_SLINE	Reference	3	0	20	0	-	-
	RG_LI24		3	0	20	1	-	-
	RG_LCUT	Mine-exposed	3	3	20	0	-	-
	RG_LILC3		3	3	20	0	-	-
	RG_LIDSL		5	3	20	0	8	1
	RG_LI8		3	0	15	0	-	-
Fording River	RG_FO23	Mine-exposed	5	3	15	0	-	-

Notes: "-" = not evaluated; % EPT = Percent EPT (Ephemeroptera ([mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]); Selenium BIT = Selenium concentrations in benthic invertebrate tissue (mg/kg dw); WCT = Westslope Cutthroat Trout.

[a] Biological Trigger analysis for %EPT and selenium WCT muscle tissue was for the September sampling event.

[b] Biological Trigger analysis for Selenium BIT was for the April, July, September, and November/December sampling events.

[c] Number of Replicates Reaching Biological Trigger for % EPT refers to those replicates which were below both triggering steps (i.e., below the lower 2.5th percentile of the habitat-adjusted normal range and expectations [as based on predicted ADIT Scores]). See Section F.2.2 for more details.

[d] Number of Replicates Reaching Biological Trigger for Selenium BIT refers to those replicates which were above both triggering steps (i.e., above the upper 97.5th percentile prediction limit of the regional normal range and expectations [as based on the predicted 95% percentile from the water to benthic invertebrate selenium bioaccumulation model]). See section F.2.3 for more details.

[e] Number of Replicates Reaching Biological Trigger for Selenium WCT Muscle Tissue refers to those replicates which were above triggering steps (i.e., above the upper 97.5th percentile prediction limit of the regional normal range and expectations [as based on the predicted 95% percentile from the 2-step bioaccumulation model - water to benthic invertebrates, invertebrates to fish]). See section F.2.4 for more details.

Four years of monitoring during the AWTF with AOP period have consistently shown that selenium concentrations in aquatic biota have decreased (compared to AWTF without AOP operation) and the receiving environment has not been influenced through effects to biological productivity or through potential effects related to factors other than nutrients or selenium. Collectively, these results have shown the AWTF with AOP is functioning as intended, conditions in Line Creek are stable, and the questions of LCO LAEMP have largely been addressed. As such, the scope of LCO LAEMP monitoring in 2023 has been adjusted in consultation with the EMC (Minnow 2023) and the monitoring program may be further adjusted as mining and water treatment develops at LCO (including adapting future study questions).

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APPENDIX A
METHODS

APPENDIX A METHODS

A1 WATER QUALITY

A1.1 Overview

Permit 107517 requires that Teck prepare annual reports that summarize monitoring data collected during the preceding calendar year at all locations specified in the permit. Observed concentrations were compared to Compliance Limits and Site Performance Objectives specified in Permit 107517, Elk Valley Water Quality Plan (EVWQP) benchmarks, and to BC water quality guidelines for protection of aquatic life (BCWQG). Data were also plotted to identify increasing or decreasing trends over time. Routine water monitoring occurs at or near at all the lotic sampling areas for the Line Creek Operations (LCO) Local Aquatic Effects Monitoring Program (LAEMP) that are situated within the Elk River watershed. Regardless, a water sample was collected at all areas concurrently with biological sampling. Methods are described as follows.

A1.2 Sample Collection

One water sample per area was collected concurrently with biological monitoring and included analysis of parameters stipulated in Permit 107517, as well as selenium speciation where applicable (Table A.1). Sample collection procedures were consistent with those outlined in the British Columbia Field Sampling Manual (Province of British Columbia 2013). *In situ* measurements of temperature, dissolved oxygen (DO), pH, and specific conductance were recorded concurrently with biological monitoring. The water quality meter used to collect *in situ* measurements was calibrated regularly and maintained according to manufacturer instructions.

Water samples were collected far enough upstream or downstream of confluences (tributaries, discharges) to avoid areas of incomplete mixing (lateral, vertical), and upstream from bridges or other structures to avoid the potential for associated contamination.

Water samples were collected by wading into a mid-channel area (unless it is not practical or safe to do so), moving from downstream to upstream, so as not to collect water downstream of disturbed substrates. Samples were collected from mid-depth by inverting sample bottles below the surface of the water. Samples were taken to shore prior to adding applicable preservatives. Water samples being analyzed for dissolved constituents were filtered in the field using a clean syringe affixed with a 0.45-µm membrane. Once filtered, the sample was preserved immediately in the manner specified by the analytical laboratory. Station location (i.e., GPS coordinates) and sample date, time, and identifier were recorded on field sheets.

Table A.1: Water Quality Parameters Required Under Permit 107517[a]

Category	Parameters
Field Parameters	temperature, specific conductance, dissolved oxygen (DO), pH
Conventional Parameters	specific conductance, total dissolved solids (TDS), total suspended solids (TSS), hardness, alkalinity, dissolved organic carbon (DOC), total organic carbon (TOC), turbidity
Major Ions	bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, sulphate
Nutrients	ammonia, nitrate, nitrite, total Kjeldahl nitrogen (TKN), orthophosphate, total phosphorus
Total and Dissolved Metals	aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, zinc

[a] Parameters are consistent with those outlined in Table 24, Appendix 3 of Permit 107517.

Samples were kept cold until analysis. Samples were shipped to the analytical laboratory daily or every other day to achieve compliance with recommended analytical hold times.

Quality assurance and quality control (QA/QC) samples were collected in the field concurrent with water samples. One water chemistry duplicate was collected at a minimum of 10 % of samples. Equipment and travel blanks represented approximately 10% of the water chemistry samples submitted to the analytical laboratory.

A1.3 Laboratory Analysis

Laboratory analytical methods were consistent with the British Columbia Environmental Laboratory Manual (Province of British Columbia 2016), where applicable.

Water samples were analyzed by ALS Environmental (ALS; Calgary, AB) for constituents consistent with Permit 107517 (i.e., conventional parameters, major ions, nutrients, and total and dissolved metals) using the following methods indicated in parentheses:

- total organic carbon (TOC) and dissolved organic carbon (DOC) (combustion method; American Public Health Association [APHA] 5310 for TOC);
- total suspended solids (TSS) and total dissolved solids (TDS; gravimetric method; APHA 2540 D and C for TSS and TDS, respectively);
- alkalinity (potentiometric titration; APHA 2320);
- turbidity (nephelometric method; APHA 2130 Turbidity);
- hardness, as $CaCO_3$ (by calculation; APHA 2340 B);
- total and dissolved metals, (collision cell inductively coupled plasma - mass spectrometry and inductively coupled plasma - optical emission spectrophotometry; APHA 3030 B&E/ Environmental Protection Agency [EPA] SW-846 6020A, and EPA 3005A/6010B, respectively);
- bromide, chloride, fluoride, and sulphate (ion chromatography; APHA 4110 B);
- ammonia, as N (fluorescence; J. Env. Monit., 2005, 7:37-42);
- nitrate and nitrite, as N (ion chromatography; EPA 300.0);
- total Kjeldahl nitrogen (TKN) (fluorescence; APHA 4500-NORG D.);

- orthophosphate and total phosphorus (colourimetric method; APHA 4500-P Phosphorus); and

Water samples were analysed by Brooks Applied Labs (Bothell, Washington) for selenium speciation analysis using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS). Analytes included selenate, selenite, dimethylselenoxide, methylseleninic acid, methaneselenonic acid, selenocyanate, selenomethionine, selenosulphate, and unknown selenium species. Selenium species were first separated on an ion exchange column and then detected using ICP-CRC-MS. The applied method was optimized to provide interference free quantitation of individual selenium species at part-per-trillion (ppt) levels. Total and dissolved selenium analyses were also performed by Brooks Applied Labs using inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). Water samples were collected into borosilicate glass containers and preserved to a pH < 2 with nitric acid. An aliquot of each preserved sample was further digested with nitric and hydrochloric acids in a closed vessel (bomb) prior to analysis. The applied sample collection, preservation, digestion, and analytical procedures are designed to accurately quantify selenium in the presence of potential interferences (e.g., chloride and bromide) and regardless of the chemical form of selenium present in solution (e.g., ionic, particulate, or volatile molecular forms).

Laboratory QA/QC associated with routine water sampling was described by Teck in the annual water quality report submitted under Permit 107517 (Teck 2023). Laboratory QA/QC associated with water samples collected concurrently with biological samples were evaluated in Appendix B.

A1.4 Data Analysis

Water quality data assessed included data for routine monitoring managed by Teck, and water samples collected at the biological monitoring stations concurrently with biological sampling. Routine water quality results were paired with the closest biological monitoring station for analysis. The location of routine water quality and biological monitoring stations differed slightly for some areas, therefore samples collected concurrently with biological sampling were named according to the biological monitoring location. For instance, the biological monitoring area RG_LCUT is situated upstream from the AWTF and mainly reflects water quality influences farther upstream on the main stem of Line Creek (LC_LCUSWLC) when the AWTF is operating, but also reflects input from West Line Creek (LC_WLC) when the AWTF is not operational (and flows are not being diverted to the AWTF for treatment). Accordingly, water quality data for RG_LCUT in 2022 (similar to 2019 to 2021) were associated with routine water

quality monitoring data from LC_LCUSWLC for data analysis because the AWTF was operational throughout the year[1].

Water quality data were downloaded from Teck's EQuIS database, including:

- Nutrient concentrations (i.e., nitrate, nitrite, ammonia, total phosphorus, and orthophosphate); total and dissolved metals, selenium concentrations (i.e., total and dissolved selenium concentrations, and selenium speciation results including concentrations of selenate, selenite, dimethylselenoxide, methylseleninic acid, selenocyanate, selenomethionine, methaneselenonic acid, selenosulphate, and unknown selenium species);

- Concentrations of analytes with early warning triggers under the AMP (i.e., total dissolved solids, sulphate, total concentrations of antimony, barium, boron, lithium, manganese, molybdenum, nickel, selenium, uranium, and zinc, and dissolved concentrations of cadmium and cobalt);

- Concentrations of analytes with British Columbia Water Quality Guidelines (BCWQGs; BCMOECCS 2021a,b) and/or water quality benchmarks (Teck 2014, Golder 2017); and

- *In situ* water quality data (i.e., temperature, pH, specific conductivity, and DO).

Data extracted from Teck's EQuIS database were screened for text values and converted to a common unit (all metal concentrations were converted to mg/L, except for total and dissolved cadmium, dissolved cobalt, total nickel, total selenium which were stored as µg/L).

Routine water quality monitoring results were screened against BCWQG (BCMOECCS 2021a,b) as part of Teck's Annual Water Quality Monitoring Report (Teck 2023) under Permit 107517. In addition, further screening against BCWQG, EVWQP level 1, level 2 and/or level 3 benchmarks, proposed benchmarks, or updated effects concentrations (Golder 2014a, 2014b, 2017; see Appendix Table E.1 for screening values) was completed for select analytes during the 2022 calendar year. Order Constituents, constituents with early warning triggers under the AMP, constituents with an SPO, and nutrients (TKN, phosphorus and orthophosphate) were plotted using available data from 2012 to 2022 for each monitoring area

[1] The AWTF was shut down for periods of over 24 hours on three occasions in 2022. The AWTF was shut down for annual maintenance on June 7, July 26 and August 30, 2022 (Teck 2023a). As the duration of these events were short, water quality data for RG_LCUT from the brief shut down periods were reported in relation to those from LC_LCUSWLC for data interpretation.

individually relative to BCWQGs, EVWQP benchmarks, and proposed benchmarks, and updated effects concentrations (where applicable). Monthly mean aqueous selenium speciation results were plotted with benthic invertebrate tissue selenium concentrations for each monitoring area.

If replicate sample results were available for a given day, the Kaplan-Meier (K-M) mean of the replicates was used. Monthly and annual means were also calculated using the K-M method. Annual means of water quality data were computed by first taking a mean of results within months and then averaging monthly means. The K-M method is non-parametric and can accommodate multiple Laboratory Reporting Limits (LRLs). This method involved transforming the left censored (i.e., < value) dataset to a right censored (i.e., > value) dataset, and then using the K-M estimator (used to estimate the mean survival time in survival analysis) to estimate the mean. The calculation was conducted using the survfit() function in the *survival* package (Therneau 2017) in R software (R Core Team 2022).

The method described in Minnow (2017) was used to visually explore temporal changes in total phosphorus and orthophosphate concentrations during AWTF operation. The method involves two steps. First, the monthly upper limits of total phosphorus and orthophosphate concentrations (97.5th percentile) were computed for the baseline (pre-AWTF operation) period at LC_LC3. Second, the monthly concentrations were plotted as a ratio of the monthly baseline 97.5th percentile concentrations (i.e., monthly mean concentration: monthly baseline 97.5th percentile concentration). These trend plots help visualize deviations from the pre-AWTF range. Total phosphorus concentrations at the Compliance Point (LC_LCDSSLCC [RG_LIDSL]) between June 15th and September 30th were also plotted relative to the phosphorus Site Performance Objective (≤ 0.02 mg/L) outlined in Permit 107517.

Temperature and dissolved oxygen concentrations in Line Creek were graphically evaluated relative to BCWQG. British Columbia water temperature guidelines for bull trout and westslope cutthroat trout[2] specify a maximum ± 1 °C change from the optimum temperature range for different life stages of these species (spawning, incubation, and rearing; BCMOE 2001). Dissolved oxygen guidelines are also specific to life stage (buried embryo/alevin and all other life stages; BCMOE 1997). Guidelines for both these parameters were applied to periods of the year relevant to the specific life stage of each of the two species, with the time periods approximated from available literature (McPhail 2007; COSEWIC 2016).

[2] Three species make up the fish community of Line Creek including bull trout, westslope cutthroat trout, and mountain whitefish. Westslope cutthroat trout and bull trout are the dominant species, while mountain whitefish are present only of in certain reaches of Line Creek and only as adult and at low densities (Zathey 2021). Therefore, data interpretation in relation to only bull trout and westslope cutthroat trout was the focus of this report.

A2 ACUTE TOXICITY TESTING

Aqueous chronic toxicity was monitored, analyzed, and interpreted under the Annual Water Quality Monitoring Program (Teck 2023). Two acute toxicity tests were conducted on a quarterly basis as part of the Annual Water Quality Monitoring Program (as per Permit 107517):

- Single concentration acute toxicity test (96-hour LC50) using rainbow trout (*Oncorhynchus mykiss*); universal method: EPS 1/RM/9 (Environment Canada 2007a); and
- Single concentration acute toxicity test (48-hour LC50) using Daphnia spp.; universal method: EPS 1/RM/11 (Environment Canada 1996).

A3 CHRONIC TOXICITY TESTING

The following chronic toxicity tests were completed quarterly or semi-annually for water samples collected at mine-exposed and reference sites, as per the Permit 107517 Chronic Toxicity Program:

- 72-hour growth/inhibition test using a freshwater alga (*Pseudokirchneriella subcapitata*) conducted quarterly using method: EPS1/RM/25; Environment Canada 2007b;
- 7-day test of reproduction and survival using the cladoceran, *Ceriodaphnia dubia* conducted quarterly using method: EPS1/RM/21; Environment Canada 2007c;
- 28-day water-only test of growth and survival using the amphipod, *Hyalella azteca* conducted semi-annually (in Q2 and Q4) using methods adapted from USEPA (2000);
- 30-day early life stage toxicity tests using rainbow trout, *Oncorhynchus mykiss* conducted semi-annually (in Q2 and Q4) using method: EPS 1/RM/28- 1E; Environment Canada 1998; and
- 28-day early life stage toxicity test using fathead minnow, *Pimephales promelas* conducted semi-annually (in Q1 and Q3) using methods: EPA-712-C-96-121; USEPA 1998; and E1241-05; ASTM 2013.

Toxicity tests and associated QA/QC measures were completed by a qualified third-party biological testing laboratory. Water quality samples were collected at the same time to support evaluation of toxicity test results. Results were reported quarterly and summarized annually by Teck in accordance with Permit 107517 requirements.

A4 PERIPHYTON

A4.1 Overview

Periphyton consists of assemblages of algae, bacteria, moulds, and fungi that live on bottom substrates (e.g., rocks). Some are autotrophs and others are decomposers. Periphyton represents an important source of food for benthic invertebrates, both during the active growing season and the non-growing season when dead tissue and non-photosynthetic components of periphyton will continue to be a food source. Periphyton abundance is influenced by many environmental factors, such as photoperiod, light intensity, water temperature, aqueous nutrient concentrations, and water flow. Exposure of periphyton to mine-related constituents occurs primarily through the water column (Trapp et al. 1990).

A4.2 Sample Collection

Periphyton productivity samples for visual assessment were collected from riffle habitat with water depth of at least 5 cm. When a sampling station with such characteristics was identified, five rocks were selected (excluding those that are too small, highly angular, or uncharacteristic in surface texture) and taken to shore. Each replicate station was spaced a minimum of 5 m apart, and five replicate stations were assessed per area.

The visual assessment of periphyton described above was completed prior to initiation of other sampling activities to avoid disturbance of the periphyton cover within the sampling area, and was based on the categories stipulated by the CABIN protocol (Environment Canada 2012):

- Rocks not slippery, no obvious colour (<0.5 mm thick);
- Rocks slightly slippery, yellow-brown to light green colour (0.5 to 1 mm thick);
- Rocks have noticeable slippery feel, patches of thicker green to brown algae (1 to 5 mm thick);
- Rocks are very slippery, numerous clumps (5 to 20 mm thick); and
- Rocks mostly obscured by algae mat, may have long strands (>20 mm thick).

The collection of periphyton coverage data from five replicate stations per area allowed for a more representative evaluation of periphyton in the area to support spatial and temporal comparisons. Photos were also be taken to document current conditions of not only periphyton conditions but also bryophytes.

A5 BENTHIC INVERTEBRATES

A5.1 Overview

Benthic invertebrates are an important component of the aquatic ecosystem of the Elk River watershed. In addition to having intrinsic value, benthic invertebrate communities in lotic habitats can be used as indicators of localized food availability (based on abundance) and habitat quality (based on richness, % Ephemeroptera, Plecoptera and Trichoptera [EPT], and % Ephemeroptera, as well as abundance of EPT and Ephemeroptera, Plecoptera, and Trichoptera individually) for receptors at higher trophic levels.

Benthic invertebrate monitoring consisted of community sampling and composite-taxa tissue chemistry sampling. Supporting measures, including habitat characterization, were also collected concurrent with benthic invertebrate samples, as described below.

Benthic invertebrate samples were collected to address study questions related to community structure (as determined via CABIN sampling), productivity (as determined via Hess sampling), and invertebrate tissue accumulation of selenium. Consistent with other LAEMPs and the RAEMP (Minnow 2021a,b and Minnow and Lotic 2021), benthic invertebrate sampling was completed in September. Individual water samples for routine water quality analysis and selenium speciation analysis were collected from each monitoring area during the sampling event, concurrently with the collection of biological samples.

A5.2 Community Structure

A5.2.1 Sample Collection

Benthic invertebrate community sampling followed the Canadian Aquatic Biomonitoring Network (CABIN) protocol, which involved a 3-minute travelling kick into a net with a triangular aperture measuring 36 cm per side and a mesh having 400-µm openings (Environment Canada 2012). During sampling, the field technician moved across the stream channel (from bank to bank, depending on stream depth and width) in an upstream direction. With the net being held immediately downstream of the technician's feet, the detritus and invertebrates disturbed from the substrate were passively collected in the kick-net by the stream current. After three minutes of sampling time, the sampler returned to the stream bank with the sample. The kick-net was rinsed with water to move debris and invertebrates into the collection cup at the bottom of the net. The collection cup was then removed, and the contents poured into a labelled plastic jar and preserved to a concentration of 10% buffered formalin solution in ambient water.

A5.2.2 Laboratory Analysis

Benthic invertebrate community samples were sent to Cordillera Consulting (lead taxonomist Scott Finlayson), in Summerland BC, for sorting and taxonomic identification. Taxonomists at Cordillera have achieved certification for Group 1 (general Arthropods West), 2 (EPT East and West), and 3 (Chironomids West) benthic organisms in the Taxonomic Certification Program of the Society for Freshwater Science. Organisms were identified to the lowest practical level (LPL) (typically genus or species). Following identification, representative specimens of each new taxon were placed in separate vials and added to the reference collection for the project (initiated in 2012).

At the beginning of the sorting process, each sample was examined and evaluated for estimation of total invertebrate numbers. If the total number was estimated to be greater than 300, then the laboratory's sub-sampling protocol was followed. Sorting efficiency and sub-sampling accuracy and precision was quantified using methods specified by Environment Canada (2014).

A5.2.3 Supporting Measures

Consistent with the requirements of the Canadian Aquatic Biomonitoring Network (CABIN) sampling protocol, supporting habitat information (i.e., water velocity and depth, *in situ* water quality [temperature, dissolved oxygen [DO], conductivity, pH], and substrate characteristics [Wolman 100-pebble count and substrate embeddedness]) were collected concurrently with benthic invertebrate community sampling (Environment Canada 2012). Periphyton scores were also ascribed to each biological monitoring area during September sampling, and according to CABIN sampling protocol (see Section A4; Environment Canada 2012).

A5.2.4 Data Analysis

Community endpoints that were evaluated included total abundance, taxonomic richness (to the lowest practicable level of taxonomy), and the abundances and proportional abundances (%) of major taxonomic groups, including the combined orders of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), collectively known as EPT,

Ephemeroptera alone, and Chironomidae (midges). Community data were plotted to show changes over time relative to regional normal ranges[3] as well as site-specific normal ranges.[4]

A5.3 Productivity

A5.3.1 Sample Collection

Samples for analysis of benthic invertebrate density, biomass, and community structure were collected in September 2022 from exposed and reference sites. The samples were collected using a Hess sampler (0.1 m^2 sampling area) with 500 µm mesh. Stations were located a minimum of 5 m apart to represent the overall area.

A single sample was collected at each station by carefully inserting the base of the Hess sampler into the substrate to a depth of approximately 5 to 10 cm. Gravel or cobble enclosed within the Hess sampler was carefully washed while allowing the current to carry dislodged organisms into the mesh collection net. Organisms collected into the net were rinsed into the bottom of the net, and then into a labelled wide-mouth plastic jar. Samples were preserved to a nominal concentration of 10% buffered formalin in ambient water within approximately 6 hours of collection, so biomass was not lost through predation or decomposition of tissues before the samples were sorted at the laboratory.

A5.3.2 Laboratory Analysis

Benthic invertebrate biomass samples were sent to ZEAS Inc. (lead taxonomist Danuta Zaranko) in Nobleton, ON, for sorting and taxonomic identification. At the laboratory, preserved organisms in each sample were sorted from the sample debris, identified, and weighed at the family-level of taxonomy. Each family group of organisms was placed onto a fine cloth to drain excess surface moisture before being weighed to the nearest 0.1 mg. Total and family-level density and biomass were reported for each sample.

A5.3.3 Data Analysis

Benthic invertebrate community endpoints that were evaluated included total biomass, total density, family richness, and the density of major taxonomic groups, including the combined

[3] The reference normal range as presented in the RAEMP represents the 2.5th and 97.5th percentiles of the 1996 to 2019 (Minnow 2020b).

[4] Site-specific normal ranges represent the 2.5th and 97.5th percentile for a given area as determined by habitat predictors for that area in relation to the complete set of Elk Valley monitoring areas. The site-specific normal ranges were estimated using regression modelling as presented in the RAEMP (Minnow 2021a).

orders of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), collectively known as EPT, Ephemeroptera alone, and Chironomidae (midges).

The potential effects of AWTF operation on benthic invertebrate biomass and density were analyzed among areas and years using an Analysis of Variance (ANOVA) model. The model was used to assess changes in the difference in benthic invertebrate biomass or density between mine-exposed and reference areas among years. Data were included for the two mine-exposed areas (RG_LIDSL and RG_LILC3) and two reference areas (RG_SLINE and RG_LI24) sampled in 2022 and included all available results from 2014 to 2022. As recommended by the EMC, the analyses were completed by separately evaluating changes at each mine-exposed area relative to the two reference areas. Outliers with studentized residuals with magnitude greater than four were removed from the analysis, and one sample from RG_SLINE in 2018 was excluded due to issues with sample preservation identified by the laboratory.

The ANOVA model that was fit to the data for each mine-exposed area (and both reference areas) was:

$$Y = CI + Year + Area(CI) + Year \times CI + Year \times Area(CI) + \epsilon$$

where:

- Y = response variable;
- CI = a fixed factor for area type with two levels (control [reference] and impact [mine-exposed]);
- $Year$ = a fixed factor for year (2014 to 2022);
- $Area(CI)$ = a fixed factor for area because there are two reference areas (nested in CI because each area can only be assigned to one level of CI);
- $Year \times CI$ = the interaction between $Year$ and CI with a significant effect suggesting the difference between mine-exposed and reference areas varies among years;
- $Year \times Area(CI)$ = the interaction between $Year$ and $Area$ with a significant effect suggesting the difference between mine-exposed and reference results depends on which reference area the mine-exposed area is being compared to; and
- ϵ = the error term.

The ANOVA model was used to test for CI effects (i.e., changes in the difference between mine-exposed and reference areas among years). These changes were assessed by testing

the significance of the interaction terms containing the $Year$ and CI terms. An α of 0.1 was used to test the significance of the interaction terms.

Interpretation of the ANOVA table began by assessing the significance of the interaction between $Area(CI)$ and $Year$. If the interaction term was significant, then the differences among areas changed over time, but it depended on which years and areas were compared. In that case, separate ANOVA models were run for each reference area with factors for $Area$ (one mine-exposed and one reference), $Year$ and $Year \times Area$. If there was a significant interaction, contrasts were conducted (with Bonferroni correction for the number of tests) to test for significant changes between the mine-exposed area and reference area among years.

If the interaction term between $Area(CI)$ and $Year$ was not significant, then the interpretation of the ANOVA table continued by assessing the significance of the interaction between CI and $Year$. This term in the model assessed whether the relative differences among area types depended on year. If this interaction term was significant, then contrasts were conducted to determine the changes between the mine-exposed area and the pooled reference areas among years.

Testing the significance of the interaction terms is the key hypothesis of interest in the ANOVA model as it tests for changes in the relative differences among areas over time. If all interaction terms are not significant, then it can be concluded that there are no $Year$ effects that can be compared to AWTF operation schedules. Data were $\log_{10}$-transformed prior to analysis.

Temporal differences in benthic invertebrate biomass and density at mine-exposed areas (RG_LILC3 and RG_LIDSL) were also assessed over the same time period (2014 to 2022) using an ANOVA for each area and endpoint. Prior to analysis, data were $\log_{10}$ transformed to better meet the assumptions of the analysis. When the overall ANOVA was significant ($\alpha < 0.1$), a Tukey's Honestly Significant Difference *post hoc* test was conducted for all pairwise comparisons.

The ANOVA models and contrasts as well as plots for visualizing the ANOVA results were conducted in R (R Core Team 2022) using customized scripts, and data were presented on $\log_{10}$-transformed y-axes for consistency with the statistical approach. Letters were used on the plots to indicate which years differed significantly from one another based on the results of the ANOVA model for temporal evaluation of biomass and density at each mine-exposed areas.

A5.4 Benthic Invertebrate Tissue

A5.4.1 Sample Collection

Benthic invertebrate samples were collected for tissue chemistry using the kick and sweep sampling method described in Section A5.2.1, except that sample collection was not timed. Samples were a composite of representative benthic invertebrate taxa in each sampling area and were collected at a similar location to those for benthic invertebrate community sampling (Section A5.2.1). If more tissue samples than community samples were collected within a monitoring area, the benthic invertebrate tissue replicate samples were collected from locations spaced a minimum of 5 m apart within the area. For each sample, clean tweezers were used to pick invertebrates from the debris until about 1 to 2 g wet weight (ww) was obtained. A photo was taken of each sample, and the dominant taxa added to the sample was recorded. Once sufficient tissue was picked from the debris, the sample was placed in a labelled vial and stored in a cooler with ice packs until it could be transferred to a freezer at the end of the day. Tissue samples were stored in a freezer and shipped frozen.

All sampling events included collection of a composite sample of a variety of benthic invertebrate taxa (composite-taxa samples). These samples are useful for comparison to baseline data, and as an estimate of dietary selenium exposure for consumer organisms (e.g., fish, birds). Field crews paid particular attention to proportions of annelids in kick and sweep collections, as these organisms have been known to hyperaccumulate some metals resulting in potentially biased results (Golder 2021). If annelids occurred at a proportion greater than 5% of the total sample biomass at a given replicate station, then these organisms were included in the composite sample (at that same proportion). Additionally in this scenario, a separate ‘annelid only’ sample was collected for analysis from the replicate station. If the proportion of annelids represented less than 5% of the sample biomass for a given station, these organisms were not included in the composite-taxa sample.

A5.4.2 Laboratory Analysis

Tissue samples were kept in a freezer until they were transported by courier in coolers with ice packs to TrichAnalytics Inc. in Saanichton, BC. Samples were dehydrated (<60°C) upon receipt by the laboratory and analyzed using Laser Ablation Inductively Coupled Plasma Mass Spectrometry (ICP-MS). QA/QC measures associated with the tissue chemistry analyses included evaluation of laboratory duplicates and certified refence materials, discussed in greater detail in the Data Quality Review (DQR) in Appendix B. Results for selenium and other constituents were reported on a dry weight basis along with moisture content to allow conversion to wet weight values, as required (see Appendix H for laboratory reports).

A5.4.3 Data Analysis

Selenium concentrations measured in composite-taxa benthic invertebrate tissues were plotted over time relative to corresponding site-specific effect benchmarks (Table A.2) and relative to the regional normal range[5]. Potential effects of AWTF operation on tissue selenium concentrations were evaluated for composite-taxa benthic invertebrate samples from each of the eight mine-exposed sampling areas using an ANOVA model. As recommended by the EMC, the analyses were completed by separately evaluating changes at each mine-exposed area relative to the two reference areas. Results reported for RG_LI24 on May 3, 2018 were excluded from analyses because these were identified as anomalous and likely the result of a field error (see Minnow 2019). Commissioning-phase discharge from the AWTF began August 27, 2014, and the facility was shut down on October 17, 2014, and recommissioned with forward flow occurring on October 26, 2015. Composite-taxa benthic invertebrate tissue selenium monitoring was completed in September 2015. Due to the brief period of exposure to less-than-capacity AWTF effluent, benthic invertebrate tissue selenium data from September 2015 are not considered representative of the AWTF operational phase but also do not represent a no-discharge condition. They were therefore excluded from ANOVA analyses but are displayed in plots for context.

The ANOVA model that was fit to the data for each mine-exposed area (and both reference areas[6]) was:

$$Y = CI + Period + Time(Period) + Period \times CI + Time(Period) \times CI + \epsilon$$

where:

- Y = response variable;
- CI = a fixed factor for area type with two levels (control [reference] and impact [mine-exposed]);
- $Period$ = a fixed factor for time with up to six levels (Before [September 2012], Initial AWTF Operational Phase [August to October 2014], AWTF Operational [February 2016 to October 2017], Shutdown [October 2014 to October 2015, March to October

[5] The reference normal range as presented in the RAEMP represents the 2.5th and 97.5th percentiles of reference area data from 1996 to 2019 (Minnow 2021a).

[6] Benthic invertebrate selenium concentration data from both reference areas (RG_LI24 and RG_SLINE) were used in the ANOVA model, if available. If data from both reference areas were not available for a given sampling event, data from a single reference area were used. Results reported for RG_LI24 on May 3, 2018 were excluded from analyses because these were identified as anomalous and likely the result of a field error (see Minnow 2019).

2018][7], Restart of AWTF with AOP [October 2018 to December 2018], and AWTF with AOP Operational Phase [December 2018 to December 2022]) depending on data availability, where each period included between one to eighteen individual sampling events and reflected the operational status of the WLC AWTF;

- $Period \times \mathrm{CI}$ = the interaction between $Period$ and CI with a significant effect suggesting the difference between mine-exposed and reference areas varies among periods;
- $Time(Period) \times \mathrm{CI}$ = the interaction between $Time(Period)$ and CI with a significant effect suggesting the difference between mine-exposed and reference areas varies among periods, but it depends on which sampling months are being compared; and
- ϵ = the error term.

Only one data-point was collected for a given area in some years (i.e., no replicate sampling). Individual data points were used in the analyses rather than means (where n > 1 at an area), thus variation was assumed to be consistent across years. Because replicates within areas were not available for all years, an $Area(CI)$ x $Year$ interaction could not be tested, and this term was excluded from the model.

Interpretation of the ANOVA table began by assessing the significance of the interaction between $Time(Period)$ and CI. If the interaction was significant, then the differences among mine-exposed and reference areas varied among periods, but this difference could be dependent on which sample months were compared. In that case, contrasts were conducted to determine differences between periods for each sampling event using an α = 0.1, with a Bonferroni correction for the number of tests. Contrasts were limited to those between the "AWTF with AOP Operational Phase" period (2022) relative to the "Before" and "AWTF Operational Phase" periods (contrasts to the "Initial Operations" and "Shutdown" periods were excluded), because these were the most relevant contrasts for evaluating AWTF performance during the "AWTF with AOP Operational Phase". Differences among sampling events within a given period were not statistically contrasted, except for data from within the "AWTF with AOP Operational" period. The differences within the "AWTF with AOP Operational" period were completed using two approaches: 1) contrasts within 2022 to

[7] Commissioning-phase discharge from the AWTF began August 27, 2014, and the facility was shut down on October 17, 2014, and recommissioned with forward flow occurring on October 26, 2015. Composite-taxa benthic invertebrate tissue selenium monitoring was completed in September 2015. Due to the brief period of exposure to less-than-capacity AWTF effluent, benthic invertebrate tissue selenium data from September 2015 are not considered representative of the AWTF operational phase but also do not represent a no-discharge condition. They were therefore excluded from ANOVA analyses, but are displayed in plots for context.

evaluate of AWTF with AOP performance in 2022 (the focus of the 2022 LCO LAEMP)[8]; and 2) contrasts of similar sampling events (e.g. April 2019 to April 2020 to April 2021 to May 2022) within the entire "AWTF with AOP Operational" period (i.e., January 2019 to December 2022) to better understand the stability of conditions throughout this operational period.

The magnitude of difference for a significant contrast was expressed in terms of the number of standard deviations as follows:

$$\text{Magnitude of Difference} = \frac{(\bar{X}_1 - \bar{X}_2)}{S_r}$$

where:

- $\bar{X}_1$ = difference between the $\log_{10}$(mean) for the mine-exposed and the $\log_{10}$(mean) for the reference areas in Sampling Event 1;
- $\bar{X}_2$ = difference between the $\log_{10}$(mean) for the mine-exposed and the $\log_{10}$(mean) for the reference areas in Sampling Event 2, and
- S_r= the standard deviation of the residuals in the ANOVA.

If the interaction term between $Time(Period)$ and CI was not significant, then the interpretation of the ANOVA table continued by assessing the significance of the interaction between $Period$ and CI. This term in the model assessed whether the relative differences between mine-exposed and reference area depended on period and if significant, contrasts (with Bonferroni correction) were used to compare among all time periods.

The magnitude of difference for a significant contrast was expressed in terms of the number of standard deviations using the equation above, where:

- $\bar{X}_1$ = difference between the $\log_{10}$(mean) for the mine-exposed and the $\log_{10}$(mean) for the reference areas in Time Period 1;
- $\bar{X}_2$ = difference between the $\log_{10}$(mean) for the mine-exposed and the $\log_{10}$(mean) for the reference areas in Time Period 2; and
- S_r= the standard deviation of the residuals in the ANOVA.

[8] The terminology used to describe the AWTF with AOP operational phase initiated on December 30, 2018 in the present report is consistent with the 2020 LCO LAEMP (Minnow 2021a), but differs from terminology in the 2019 LCO LAEMP report, which identified two AWTF operational phases after December 30, 2018: "AWTF Operational Stabilization" and "AWTF/AOP Steady State Operation" (Minnow 2020a). In the 2020 and the current LCO LAEMP report, after December 30, 2018 has been termed as a single "AWTF with AOP Operational" phase (see Section 1.3 for more details).

The ANOVA model outlined above was also used to evaluate changes in the difference of tissue selenium concentrations between sampling areas located upstream (RG_FRUL) and downstream (RG_FO23) of Line Creek on the Fording River. Data were $\log_{10}$-transformed prior to analysis using ANOVA. The ANOVA models and contrasts as well as plots for visualizing those results were conducted in R (R Core Team 2022), and data were presented on $\log_{10}$-transformed y-axes for consistency with the statistical approach.

Spatial differences in tissue selenium concentrations among areas during each sampling event in 2022 were tested using an ANOVA. Prior to analysis, data were $\log_{10}$ transformed to better meet the assumptions of the analysis. When the overall ANOVA was significant ($\alpha < 0.05$), a Tukey's Honestly Significant Difference *post hoc* test was conducted for all pairwise comparisons. The ANOVA models and contrasts as well as graphical plots were conducted in R (R Core Team 2022) using customized scripts, with letters used to indicate which years differed significantly from one another.

Composite-taxa benthic invertebrate tissue selenium results from September 2012 to December 2022 were plotted relative to total selenium concentrations measured in water samples collected at or near the same time (within approximately three days) and location as the tissue samples. A line representing the regional one-step water-to-invertebrate selenium bioaccumulation model was also presented on the plot (Golder 2020). Prediction intervals (95% percentile) for the model were calculated using the formula below (as described in Whitmore 1986):

$$\hat{Y} \pm t_{\frac{\alpha}{2},n-2} S_r \sqrt{(1 + \frac{1}{n} + \frac{(x - \bar{x})^2}{(n-1)S_x^2})}$$

where:

- $\hat{Y}$= the fitted regression value at X
- S_r= the root mean square deviation of the fitted regression model (= 0.148; $\log_{10}$ transformed)
- n = sample size (= 530)
- $\bar{X}$ = mean of the sample X_i values (= 0.817)
- S_x^2 = variance of the sample X_i values (= 0.866).

A possible increase in benthic invertebrate selenium concentrations at the reference area RG_SLINE since 2017 was noted and flagged by the EMC for further investigation. To better understand this trend, temporal changes in benthic invertebrate tissue concentrations at

RG_SLINE were quantified using an ANOVA with factors *Year* and *Month* and their interaction. When the interaction the interaction between *Year* and *Month* was significant, it indicated that the differences among years varied among the months. Post-hoc comparisons were then conducted to test for differences among years for each month using a Tukey's Honestly Significant Difference *post hoc* test. Magnitudes of difference were calculated as a percent difference from the base year of monitoring

$$MOD = \frac{MCT_{Yeari} - MCT_{baseyear}}{MCT_{baseyear}} \text{ x } 100\%$$

Where the measures of central tendency (MCT) were the estimated marginal means from the ANOVA model. The ANOVA model and contrasts were conducted in R (R Core Team 2022).

A6 FISH

A6.1 Sample Collection

Eight mature westslope cutthroat trout (WCT) were collected by angling from RG_LIDSL in September 2022. Upon capture, fish were anesthetized using clove oil prior to processing. Measures of body weight were collected using appropriately sized spring scales (e.g., 100 g, 500 g, 1,000 g), and total and fork lengths were recorded using a measuring board equipped with a metre stick (± 1 mm). All fish were inspected for any deformities, erosions (fin and gill), lesions, tumors, or parasites during processing and representative photographs were collected. A biopsy punch was used to collect a non-lethal muscle sample from each fish, and VetbondTM tissue adhesive was used to seal the wound and prevent infection. Skin was removed from each muscle sample using a scalpel and the remaining tissue was placed into a sterile microcentrifuge tube. Samples were stored on ice in the field and transferred to a freezer later in the day. Tissue samples were kept in a freezer until they were transported overnight in coolers with ice packs to an accredited laboratory.

A6.2 Laboratory Analysis

See section A5.4.2 for laboratory methods.

A6.3 Data Analysis

Fish tissue data[9] collected from Line Creek as part of the RAEMP (Minnow 2021a) were incorporated into this report to continue the evaluation of fish tissue quality monitoring included in prior years of the LCO LAEMP (Minnow 2017, 2018, 2019). Selenium concentrations in WCT muscle were plotted in comparison to the applicable site-specific muscle benchmark (15.5 mg/kg dw; Table A.2). Ovary selenium concentrations of WCT from these areas were estimated from the muscle tissue concentrations based on the ovary-to-muscle concentration relationship of 1.6:1 (Nautilus and Interior Reforestation 2011) and plotted in comparison to site-specific effect benchmarks (Teck 2014; Table A.2). Data from 2022 were plotted relative to WCT tissue selenium concentrations in areas of Line Creek and the Fording River from previous years (2001 to 2022).

Estimated WCT ovary tissue selenium results from 2001 to 2022 were plotted relative to the upper prediction interval (95% percentile) of the regional two-step model from

[9] The DQR for the fish tissue chemistry collected at RG_LIDSL will be presented in the 2020-2022 RAEMP report.

Table A.2: Selenium Benchmarks for Benthic Invertebrate and Westslope Cutthroat Trout Tissues in the Elk Valley

Endpoint	Tissue Type	Benchmark			Source
		Value (µg/g dw)	Type	Description	
Benthic Invertebrate Tissue	Whole body	4[a]	BC guideline	Interim guideline for aquatic dietary tissue based on weight of evidence of lowest published toxicity thresholds and no uncertainty factor applied	BCMOE (2014)
	Whole body	13	Site-specific benchmark	Level 1 (~10% effect) benchmark for growth, reproduction and survival of invertebrates	Teck (2014)
	Whole body	20	Site-specific benchmark	Level 2 (~20% effect) benchmark for growth, reproduction and survival of invertebrates	Teck (2014)
	Whole body	27	Site-specific benchmark	Level 3 (~50% effect) benchmark for growth, reproduction and survival of invertebrates	Golder (2014)
	Whole body	11[b]	Site-specific benchmark	Level 1 (~10% effect) benchmark for dietary effects to juvenile fish (growth)	Teck (2014)
	Whole body	18	Site-specific benchmark	Level 2 (~20% effect) benchmark for dietary effects to juvenile fish (growth)	Teck (2014)
	Whole body	26	Site-specific benchmark	Level 3 (~50% effect) benchmark for dietary effects to juvenile fish (growth)	Golder (2014)
	Whole body	15	Site-specific benchmark	Level 1 (~10% effect) benchmark for dietary effects to juvenile birds	Teck (2014)
	Whole body	22	Site-specific benchmark	Level 2 (~20% effect) benchmark for dietary effects to juvenile birds	Teck (2014)
	Whole body	41	Site-specific benchmark	Level 3 (~50% effect) benchmark for dietary effects to juvenile birds	Golder (2014)
Westslope Cutthroat Trout	Egg/ovary	25	Site-specific benchmark	Level 1 (~10% effect) benchmark for westslope cutthroat trout reproduction	Teck (2014)
	Egg/ovary	27	Site-specific benchmark	Level 2 (~20% effect) benchmark for westslope cutthroat trout reproduction	Teck (2014)
	Egg/ovary	33	Site-specific benchmark	Level 3 (~50% effect) benchmark for westslope cutthroat trout reproduction	Teck (2014)
	Muscle/muscle plug	15.5	Site-specific benchmark	Muscle equivalent to the 25 mg/kg dw ovary benchmark, based on the relationship observed between selenium in muscle and ovary in westslope cutthroat trout	Nautilus Environmental and Interior Reforestation (2011)

Notes: µg/g = microgram per gram. dw = dry weight. BC = British Columbia. BCMOE = British Columbia Ministry of the Environment.

[a] BC guidelines were not used in assessment of benthic invertebrate tissue selenium concentrations. Assessment was completed relative to site-specific benchmarks only.

[b] Site-specific benchmark is not applicable to effects to juvenile westslope cutthroat trout because studies with Yellowstone cutthroat trout have reported no effects at the Level 1 benchmark (see Teck [2014], Annex E, Appendix D [Elk Valley Water Quality Plan – Selenium Toxicity Literature Review]).

water-to-invertebrates-to-fish egg/ovary selenium bioaccumulation model[10] (Golder 2018). Prediction intervals (95% percentile) for the model were calculated using total selenium concentrations measured in water samples collected at or near the same location and time as WCT tissue collection and the same formula used for the benthic invertebrate model, but using the following parameters:

- S_r= 0.161; $\log_{10}$ transformed
- n = 112
- $\bar{X}$ = 0.867
- S_x^2 = 0.580.

[10] A two-step model from water-to-invertebrates-to-fish muscle selenium bioaccumulation model is not available as a focus has been on eggs of various organisms including fish, birds, and amphibians (Golder 2018).

A7 CALCITE

A7.1 Sample Collection

In addition to the CABIN requirements, measurements of calcite presence and concretion were conducted on 100 particles (pebbles) at each biological sampling location concurrent with (and using the same particles as) the 100-pebble count. Calcite presence (Cp) has historically been a binary assessment (i.e., presence [score = 1] or absence [score = 0]; Teck 2016, Lotic 2021). In 2021, an additional method for assessing calcite presence in lotic environments was included (Cp', Lotic 2021, Zathey 2021, Robinson et al. 2022) that scored the percent of the particle surface area covered by calcite as a decimal to the nearest 10th percentile (0.1, 0.2, 0.3, etc.; see Appendix G)[11]. The degree of concretion (Cc) was assessed by determining if the particle was removed with negligible resistance (not concreted; score = 0), noticeable resistance but removable (partially concreted; score = 1), or immovable (fully concreted; score = 2). If distinct particles were not visible due to heavy calcification, values of 1 (for presence) and 2 (for concretion) were recorded. If fines were encountered and calcite presence could not be visually confirmed, values of 0 (for presence) and 0 (for concretion) were recorded. If rocks were visible under fine material, the rock was selected for calcite measurements.

A7.2 Data Analysis

The results for the 100 particles was expressed as a Calcite Index (CI and CI') based on the following equations (Lotic 2021, Zathey et al. 2021a, Robinson et al. 2022):

$$CI = C_p + C_c \text{ or } CI = C_p' + C_c$$

Where:

$$CI \text{ or } CI' = Calcite\ Index^{12}$$

$$C_p = Calcite\ Presence\ Score = \frac{Number\ of\ particles\ with\ calcite}{100\ (binary\ score)}$$

$$C_p' = Calcite\ Presence\ Score = \frac{Number\ of\ particles\ with\ calcite}{100\ (proportional\ score)}$$

$$C_c = Calcite\ Concretion\ Score = \frac{Sum\ of\ particle\ concretion\ scores}{100}$$

[11] The new calcite assessment method was developed under the Regional Calcite Monitoring Program as a means to better describe the degree, extent, and trends of calcite deposition (Zathey 2021)

[12] CI refers to the binary assessment of Cp and CI' refers to the proportional assessment of Cp'.

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APPENDIX B
DATA QUALITY REVIEW
(DQR)

APPENDIX B DATA QUALITY REVIEW

B1 INTRODUCTION

B1.1 Background

A variety of factors can influence the physical, chemical, and biological measurements made in an environmental study and thus affect the accuracy and/or precision of the data. Depending on their magnitude, inaccuracy, or imprecision have the potential to affect the reliability of conclusions made from data. Therefore, it is important to ensure that programs incorporate appropriate steps to control non-natural sources of data variability (i.e., minimize variability that does not reflect authentic spatial and temporal variability in the environment) and thus assure the quality of the data. Data quality as a concept is meaningful only when it relates to the intended use of the data. That is, one must know the context in which the data will be interpreted in order to establish a relevant basis for judging whether or not the data set is adequate. A data quality review (DQR) involves the comparison of field and laboratory measurement performance to Data Quality Objectives (DQOs) established for a particular study, such as evaluation of Laboratory Reporting Limits (LRL), blank sample data, data precision (based on field and laboratory duplicate samples), and data accuracy (based on matrix spike recoveries and/or analysis of standards or certified reference materials). Trusted analytical laboratories certified by Canadian Association for Laboratory Accreditation (CALA) or the National Environmental Laboratory Accreditation Program (NELAP) with a rigorous internal quality assurance program were selected to ensure the highest possible data quality. DQOs were established *a priori* to reflect reasonable and achievable performance expectations (Table B.1). Programs involving many samples and analytes usually yield some results that exceed DQOs. This is particularly so for multi-element scans, as the analytical conditions are not necessarily optimal for every element included in the scan. Generally, scan results may be considered acceptable if no more than 20% of the parameters fail to meet DQOs. Overall, the intent of a DQR is not to reject any measurement that did not meet a DQO, but to ensure that any questionable data received more scrutiny to determine what effect, if any, this had on interpretation of results within the context of the project.

B1.2 Quality Control Samples

A Data Quality Review (DQR) was conducted on all laboratory data collected as part of the 2022 Line Creek Local Aquatic Effects Monitoring Program (LAEMP). The objective of a DQR is to define the overall quality of the data presented in the report, and, by extension, the confidence with which the data can be used to derive conclusions.

Table B.1: Laboratory Data Quality Objectives for the Line Creek LAEMP, 2022

Quality Control Measure	Quality Control Sample Type/Check	Study Component				
		Water Chemistry	Sediment Chemistry	Selenium Speciation	Benthic Invertebrate Community	Benthic Invertebrate Tissue Chemistry
		ALS Environmental		Brooks Applied Labs	Cordillera Consulting	TrichAnalytics
Analytical Laboratory LRLs	Comparison of actual LRL versus target LRL	LRL for each parameter should be at least as low as applicable guidelines, benchmarks, and screening values	LRL for each parameter should be at least as low as applicable guidelines and benchmarks	LRL for each parameter should be at least as low as applicable guidelines, benchmarks, and screening values	-	LRL for each parameter should be at least as low as applicable guidelines and benchmarks
Blank Analysis	Field, Trip, or Laboratory Blank	Concentrations measured in blank samples should be < LRL	Concentrations measured in blank samples should be < LRL	Concentrations measured in blank samples should be < LRL	-	-
Laboratory Precision	Laboratory Duplicates	< 4% (pH) <10% (conductivity) ≤15% RPD or <2x LRL (ORP, turbidity) ≤20% RPD or <2x LRL (all remaining analytes)	≤ 5% RPD (pH 1:2soil:water) ≤20% RPD (inorganic carbon, moisture) ≤30% RPD, 40% RPD or diff < 2x LOR (total metals) ≤ 50% RPD, 60-130% RPD or diff < 2xLOR RPD (PAHs)	≤25% RPD (selenium species) ≤20% RPD (total selenium)	-	≤60% RPD (calcium and strontium) ≤40% RPD (all remaining analytes)
	Organism Sorting Efficiency	-	-	-	≥95%	-
	Organism Sub-Sampling Precision and Accuracy	-	-	-	<20% between subsamples	-
Accuracy	Recovery of Blank Spike	-	-	75 to 125% (methylseleninic acid, selenate, selenite, selenocyanate, selenomethionine, total selenium)	-	-
	Recovery of Matrix Spike	70 to 130% (TKN, orthophosphate, phosphorus, TOC, DOC, total and dissolved metals) 75 to 125% (ammonia, bromide, chloride, fluoride, nitrate, nitrite, sulphate)	-	75 to 125% (selenate, selenite, selenocyanate, selenomethionine, total selenium)	-	-
	Matrix Spike Duplicate	-	-	75 to 125% (selenate, selenite, selenocyanate, selenomethionine, total selenium)	-	-
	Recovery of Certified Reference Material	-	40 - 160 % (boron, thalium) 70 130 % (all other analytes) 80 - 120 % (inorganic cabon, total carbon) 96 - 104 % (pH)	75 to 125% (total selenium)	-	60 to 140% (antimony, barium, boron, silver, tin, titanium) 90 to 110% (selenium) 70 to 130% (all remaining analytes)
	Laboratory Control Sample	75 to 125% (TKN) 80 to 120% (orthophosphate, phosphorus, DOC, TOC, total and dissolved metals) 85 to 115% (acidity, alkalinity, ammonia, bromide, TDS, TSS, turbidity) 90 to 110% (conductivity, chloride, fluoride, nitrate, nitrite, sulphate) 98.6-101% (pH) 95.4 to 104% (ORP)	50 - 130% (naphthalene, naphthalene-d8) 60 - 130% (PAHs) 80 - 120% (all other analytes) 90 - 110% (inorganic carbon, moisture) 97 - 103% (pH 1:2 soil:water)	-	-	-
	Taxonomic Accuracy	-	-	-	<5% TIR	-

Notes: LRL = Laboratory Reporting Limit; "-" = not applicable; < = less than; ≤ = less than or equal to; % = percent; RPD = Relative Percent Difference; ORP = oxidation-reduction potential; TKN = Total Kjeldahl Nitrogen; TOC = total organic carbon; DOC = dissolved organic carbon; TSS = total suspended solids; TDS = total dissolved solids; mg/kg dw = milligrams per kilogram dry weight; TIR = total identification error rate.

A DQR involves the examination of analytical results associated with several types of Quality Control (QC) samples collected or prepared in the field and laboratory. General QC samples collected for this project include the following:

- **Blanks** are samples of de-ionized water and/or appropriate reagent(s) that are handled and analyzed in the same way as regular samples. These samples will reflect any contamination of samples occurring in the field (in the case of field or travel blanks) or in the laboratory (in the case of laboratory or method blanks). Analyte concentrations should be below detection.
- **Laboratory Duplicates** are replicate sub-samples created in the laboratory from randomly selected field samples which are sub-sampled and then analyzed independently using identical analytical methods. The laboratory duplicate sample results reflect any variability introduced during laboratory sample handling and analysis and thus provide a measure of laboratory precision.
- **Field Duplicates** are samples collected from a randomly selected field station that are homogenized to the extent possible, split and analyzed separately in the laboratory. The duplicate samples are handled and analyzed in an identical manner in the laboratory.
- **Spike Recovery Samples** are created in the laboratory by adding a known amount/concentration of a given analyte (or mixture of analytes) to a randomly selected test sample previously divided to create two sub-samples. The spiked and regular sub-samples are then analyzed in an identical manner. The spike recovery represents the difference between the measured spike amount (total amount in the spiked sample minus the amount in the original sample) relative to the known spike amount (as a percentage). Two types of spike recovery samples are commonly analyzed: spiked blanks (or blank spikes) are created using laboratory control materials whereas matrix spikes (MS) are created using field-collected samples and are sometimes further tested in duplicate (matrix spike duplicates, MSD). The analysis of spiked samples provides an indication of the accuracy of analytical results.
- **Certified Reference Materials (CRM) or Reference Materials (RM)** are commercially prepared (or commercially homogenized) samples containing known chemical concentrations that are processed and analyzed along with batches of environmental samples. The sample results are then compared to the known concentrations to provide a measure of analytical accuracy. The results are reported as the percent of the known concentration that was recovered in the analysis.

- **Laboratory Control Samples** are created in the laboratory to have a known analyte concentration in a matrix free of interferences, such as deionized water or reference sand. The sample results are compared to the target results to confirm that the analytical method is accurate in a purified reference sample. The results are reported as the percent of the known concentration that was recovered in the analysis.

- **Laboratory Sorting Efficiency** are randomly selected grabs of the initially sorted community material. These samples are recounted and the number of invertebrates that were not recovered during the initial sort was determined. In order to reduce bias, recounting is conducted by an analyst uninvolved in the initial sample processing. This check is performed on 10% of samples and determines the accuracy through assessment of recovery (sorting) efficiency and quantifies any under-estimation of organism enumeration.

- **Taxonomic Quality Control Samples** are a randomly selected portion of a benthic invertebrate community field sample to be assessed by the laboratory using an internal quality control audit. A blind re-enumeration and re-identification of random samples is performed by an analyst uninvolved in the original sample processing. This assessment quantifies taxonomic misidentification among laboratory analysts and ensures accurate organism identities are reported.

- **Laboratory Subsamples** are community samples prepared by the laboratory to ensure that the fraction of the total sample examined was an accurate representation of the total number of organisms. By comparing the amount recovered between at least two sub-samples, one can assess the analytical precision. In addition, comparisons of the sub-samples from the whole community sample allows for an evaluation of sub-sampling accuracy.

B2 WATER CHEMISTRY

B2.1 Laboratory Reporting Limits

The analytical reports for water chemistry from ALS Environmental (ALS; CG2205126, CG2205191, CG2205354, CG2209065, CG2209232, CG2209323, CG2209155, CG2212408, CG2212276, CG2212561, CG2212665, CG2212821, CG2216667, CG2216689, CG2216739, and CG2216778; Appendix H) and Brooks Applied Labs (BAL; 2205163, 2207261, 2209188, 2209288, and 2212177; Appendix H) were examined to assess LRLs relative to analyte concentrations and applicable guidelines (Tables B.2 and B.3). Water quality data from 2022 were entered directly into Teck's EQuIS database, and thus were assessed as part of Teck's annual water quality reporting in 2022. The LRLs for water quality analytes were assessed relative to British Columbia Water Quality Guidelines (BC WQG; BCMOECCS 2021a,b) for the protection of freshwater aquatic life, Elk Valley Water Quality Plan (EVWQP; Teck 2014) benchmarks, screening values for water quality (Teck 2020), and relevant site-specific benchmarks. Several analytes were reported at concentrations below the LRL in 100% of samples (Tables B.2 and B.3). For those analytes with one or more result(s) below the LRL, achieved LRLs were consistently lower than the BCWQG, EVWQP benchmarks, and screening values for water quality (as applicable). Only one analyte, total mercury, had results that were frequently below the LRL, and which had an LRL (i.e., 0.000005 mg/L) that was higher than the BCWQG of 0.00000125 mg/L; however, past studies have shown that mercury inputs (total and methyl) in the Elk Valley Area are not related to mining activities (Azimuth 2019). Therefore, the achieved LRLs were appropriate for this study.

B2.2 Laboratory and Field Blanks

A total of 283 method blank (MB) samples were analyzed in the ALS laboratory reports (Appendix H). Of the 1,488 reported method blank individual analyte results, only five results were above detection, including one result each for total arsenic and vanadium, one result for dissolved silicon, and two results for total aluminum (see laboratory reports CG2209065, CG2205354, and CG2212561 in Appendix H). As these exceedances only represent 0.34% of MB results and do not include any primary analytes, these laboratory flags had a negligible impact on ALS water chemistry data reliability.

A total of 40 MB samples were analyzed in the BAL laboratory reports (Appendix H). Of the 200 reported method blank results, only one result was above the LRL (0.5% of results; see laboratory reports 2205163 in Appendix H) and so did not meet the DQO. As 99.5% of MB results met the DQO, laboratory contamination was not considered to be of concern.

Table B.2: Evaluation of Water Chemistry Laboratory Reporting Limits, LCO LAEMP, 2022

Parameter	Units	BCWQG[a]		EVWQP Level 1 Benchmarks/ Relevant Screening Values[b]	Range of LRLs	No. Sample Results < LRL	No. LRLs > Guideline[c]
		Long-term	Short-term				
Physical Tests							
Acidity (as $CaCO_3$)	mg/L	-	-	-	2	31 (91.2%)	-
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	-	-	-	1	11 (32.4%)	-
Alkalinity, Carbonate (as CO_3)	mg/L	-	-	-	1	11 (32.4%)	-
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	-	-	-	1	34 (100%)	-
Alkalinity, Hydroxide (as OH)	mg/L	-	-	-	1	34 (100%)	-
Total Suspended Solids	mg/L	-	-	-	0.1 to 1.5	14 (41.2%)	-
Anions And Nutrients							
Bromide	mg/L	-	-	-	0.05 to 0.25	34 (100%)	-
Ammonia, Total (as N)	mg/L	0.305	1.59	-	0.005	31 (91.2%)	0
Nitrite (as N)	mg/L	0.02	0.06	-	0.001	11 (32.4%)	0
Total Kjeldahl Nitrogen	mg/L	-	-	-	0.005 to 0.5	11 (32.4%)	-
Orthophosphate	mg/L	-	-	-	0.001	24 (70.6%)	-
Total Phosphorus	mg/L	-	-	-	0.002	2 (5.88%)	-
Organic/Inorganic Carbon							
Dissolved Organic Carbon	mg/L	-	-	-	0.5	20 (58.8%)	-
Total Organic Carbon	mg/L	-	-	-	0.5	20 (58.8%)	-
Total Metals							
Aluminum	mg/L	Variable	-	-	0.003	3 (8.82%)	-
Antimony	mg/L	0.009	-	-	0.0001	7 (20.6%)	0
Arsenic	mg/L	-	0.005	-	0.0001	3 (8.82%)	0
Beryllium	mg/L	0.00013	-	-	0.00002	34 (100%)	0
Bismuth	mg/L	-	-	-	0.00005	34 (100%)	-
Boron	mg/L	1.2	-	-	0.01	13 (38.2%)	0
Copper	mg/L	-	-	-	0.0005	34 (100%)	-
Iron	mg/L	-	1	-	0.01	20 (58.8%)	0
Lead	mg/L	0.00728	0.102	-	0.00005	30 (88.2%)	0
Manganese	mg/L	1.1286	1.85	-	0.0001	2 (5.88%)	0
Mercury	mg/L	0.00000125	-	-	0.0000005	29 (85.3%)	27 (79.4%)
Nickel	mg/L	0.109	-	-	0.0005	5 (14.7%)	0
Silver	mg/L	0.0015	0.003	-	0.00001	34 (100%)	0
Thallium	mg/L	0.0008	-	-	0.00001	28 (82.4%)	0
Tin	mg/L	-	-	-	0.0001	34 (100%)	-
Titanium	mg/L	-	-	-	0.0003	30 (88.2%)	-
Vanadium	mg/L	-	-	-	0.0005	29 (85.3%)	-
Zinc	mg/L	0.03	0.055	-	0.003	12 (35.3%)	0
Dissolved Metals							
Aluminum	mg/L	0.05	0.1	-	0.001	16 (47.1%)	0
Antimony	mg/L	-	-	-	0.0001	8 (23.5%)	-
Arsenic	mg/L	-	-	-	0.0001	9 (26.5%)	-
Beryllium	mg/L	-	-	-	0.00002	34 (100%)	-
Bismuth	mg/L	-	-	-	0.00005	34 (100%)	-
Boron	mg/L	-	-	-	0.01	12 (35.3%)	-
Cadmium	mg/L	0.000240	0.0007	0.000156	0.000005	1 (2.94%)	0
Chromium	mg/L	-	-	-	0.0001	4 (11.8%)	-
Cobalt	mg/L	-	-	-	0.0001	34 (100%)	-
Copper	mg/L	-	-	-	0.0002	14 (41.2%)	-
Iron	mg/L	-	0.35	-	0.01	34 (100%)	0
Lead	mg/L	-	-	-	0.00005	34 (100%)	-
Manganese	mg/L	-	-	-	0.0001	6 (17.6%)	-
Mercury	mg/L	-	-	-	0.000005	34 (100%)	-
Nickel	mg/L	-	-	0.00263	0.0005	6 (17.6%)	0
Silver	mg/L	-	-	-	0.00001	34 (100%)	-
Thallium	mg/L	-	-	-	0.00001	25 (73.5%)	-
Tin	mg/L	-	-	-	0.0001	34 (100%)	-
Titanium	mg/L	-	-	-	0.0003	34 (100%)	-
Vanadium	mg/L	-	-	-	0.0005	34 (100%)	-
Zinc	mg/L	-	-	-	0.001	5 (14.7%)	-

Notes: Only analytes with at least one result < Laboratory Reporting Limit (LRL) or LRL were above guidelines were displayed. The total number of samples in 2022 (n) was 34. EVWQP = Elk Valley Water Quality Plan; "-" = no applicable guideline exists.

[a] British Columbia Water Quality Guidelines for the protection of Aquatic Life (BCMOECCS 2021a,b).

[b] Where more than one EVWQP Level 1 Benchmark or screening value was applicable, the most conservative (lowest) value was used.

[c] The LRLs for all analytes were consistently less than the applicable EVWQP Level 1 benchmarks (Teck 2014) or screening values (Golder 2014; Teck 2020).

Table B.3: Evaluation of Selenium Speciation Laboratory Reporting Limits, LCO LAEMP, 2022

Parameter	Units	Range of LRLs	No. Sample Results < LRL
DMSeO - Dimethylselenoxide	mg/L	0.01	37 (100%)
MeSe(IV) - Methylseleninic Acid	mg/L	0.01	30 (81.1%)
MeSe(VI) - Methaneselenonic Acid	mg/L	0.01	31 (83.8%)
Se(IV) - Selenite	mg/L	0.01 to 0.02	3 (8.11%)
SeCN - Selenocyanate	mg/L	0.01	37 (100%)
SeMe - Selenomethionine	mg/L	0.01	37 (100%)
Selenosulfate	mg/L	0.01	37 (100%)
Selenium Unknown	mg/L	0.01	37 (100%)

Notes: Only analytes with at least one result < Laboratory Reporting Limit (LRL) or LRL were above guidelines were displayed. No guidelines exist for any analyte that has at least one result below the LRL. The total number of samples in 2022 (n) was 37.

Four field blank samples and four trip blank samples were submitted to ALS for water chemistry analyses to assess the potential for field sampling contamination (see laboratory reports CG2205126, CG2205354, CG2209065, CG2216667, and CG2212821 in Appendix H). The same DQOs that were used for laboratory blanks were also used for field blanks (i.e., concentrations should be below the LRL). Of the 372 individual analyte results measured in the field blanks, only four (1.08% of results; one result each for total barium, total molybdenum, dissolved beryllium, and dissolved sodium) were above the LRL and so did not meet the laboratory DQO (Table B.4). Of the 326 individual analyte results for trip blank samples, only four results (1.23% of results; one result each for acidity as $CaCO_3$, total ammonia, total barium, and dissolved molybdenum) were above the LRL and did not meet the laboratory DQO (Table B.4). All of the analytes that were above detection in field or trip blank samples are generally analytes of low concern in the LCO LAEMP. Additionally, as relatively few results were above detection (~ 1% in both field and trip blanks), field and laboratory contamination of water samples was considered of little to no concern.

Four field blank samples were submitted to BAL for aqueous selenium speciation analyses to assess potential field sampling contamination. Selenate was detectable in two samples (50% of results for selenate; Table B.5). While these results only represent 3.64% of all field blank results, this potential field contamination will be taken into account during data interpretation.

B2.3 Data Precision

A total of 26 laboratory duplicate samples were used to evaluate precision within the ALS laboratory reports (Appendix H). All of the 1,494 individual analyte results met the laboratory DQO, and so ALS laboratory analytical precision was considered excellent. A total of 14 laboratory duplicate samples were used to evaluate precision within the BAL laboratory reports (Appendix H). Of the 46 individual analyte results, two did not meet the laboratory DQO (dimethylselenoxide and selenosulfate, see laboratory report 2205163 in Appendix H). As these results only represent 4.35% of laboratory duplicate results, BAL laboratory analytical precision was overall considered good.

Four sets of field duplicate samples were collected to assess field sampling precision for water chemistry analyzed by ALS (Table B.6). Several relative percent differences (RPDs) could not be calculated as both analyte concentrations were below the LRL. Of the 245 RPDs that could be calculated, 20 RPDs were greater than 30% (8.16% of comparisons), including one RPD each for total dissolved solids, turbidity, total ammonia, nitrite, orthophosphate, total phosphorous, dissolved organic carbon, total organic carbon, total aluminum and chromium, and dissolved chromium, copper, and zinc, two RPDs each for dissolved aluminum and total

Table B.4: Field Blank and Trip Blank Evaluation for Water Chemistry Analyses, LCO LAEMP, 2022

Parameter	Units	No. Sample Results < LRL	No. Trip Blank Results < LRL
Physical Tests			
Acidity (as $CaCO_3$)	mg/L	4 (100%)	3 (75%)
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	4 (100%)	4 (100%)
Alkalinity, Bicarbonate (as HCO_3)	mg/L	4 (100%)	4 (100%)
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	4 (100%)	4 (100%)
Alkalinity, Carbonate (as CO_3)	mg/L	4 (100%)	4 (100%)
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	4 (100%)	4 (100%)
Alkalinity, Hydroxide (as OH)	mg/L	4 (100%)	4 (100%)
Alkalinity (as $CaCO_3$)	mg/L	4 (100%)	4 (100%)
Conductivity	µS/cm	4 (100%)	4 (100%)
Hardness (as $CaCO_3$), Dissolved	mg/L	4 (100%)	4 (100%)
Hardness (as $CaCO_3$)	mg/L	4 (100%)	4 (100%)
Total Dissolved Solids	mg/L	4 (100%)	4 (100%)
Total Suspended Solids	mg/L	4 (100%)	4 (100%)
Anions And Nutrients			
Bromide	mg/L	4 (100%)	4 (100%)
Chloride	mg/L	4 (100%)	4 (100%)
Fluoride	mg/L	4 (100%)	4 (100%)
Ammonia, Total (as N)	mg/L	4 (100%)	3 (75%)
Nitrate (as N)	mg/L	4 (100%)	4 (100%)
Nitrite (as N)	mg/L	4 (100%)	4 (100%)
Total Kjeldahl Nitrogen	mg/L	4 (100%)	4 (100%)
Orthophosphate	mg/L	4 (100%)	4 (100%)
Total Phosphorus	mg/L	4 (100%)	4 (100%)
Sulphate	mg/L	4 (100%)	4 (100%)
Ion Balance			
Anion Sum	meq/L	4 (100%)	4 (100%)
Cation Sum	meq/L	4 (100%)	4 (100%)
Organic / Inorganic Carbon			
Dissolved Organic Carbon	mg/L	4 (100%)	-
Total Organic Carbon	mg/L	4 (100%)	4 (100%)
Total Metals			
Aluminum	mg/L	4 (100%)	4 (100%)
Antimony	mg/L	4 (100%)	4 (100%)
Arsenic	mg/L	4 (100%)	4 (100%)
Barium	mg/L	3 (75%)	3 (75%)
Beryllium	mg/L	4 (100%)	4 (100%)
Bismuth	mg/L	4 (100%)	4 (100%)
Boron	mg/L	4 (100%)	4 (100%)
Cadmium	mg/L	4 (100%)	4 (100%)
Calcium	mg/L	4 (100%)	4 (100%)
Chromium	mg/L	4 (100%)	4 (100%)
Cobalt	mg/L	4 (100%)	4 (100%)
Copper	mg/L	4 (100%)	4 (100%)
Iron	mg/L	4 (100%)	4 (100%)
Lead	mg/L	4 (100%)	4 (100%)
Lithium	mg/L	4 (100%)	4 (100%)
Magnesium	mg/L	4 (100%)	4 (100%)
Manganese	mg/L	4 (100%)	4 (100%)
Mercury	mg/L	4 (100%)	-
Molybdenum	mg/L	3 (75%)	4 (100%)
Nickel	mg/L	4 (100%)	4 (100%)
Potassium	mg/L	4 (100%)	4 (100%)
Selenium	mg/L	4 (100%)	4 (100%)
Silicon	mg/L	4 (100%)	4 (100%)
Silver	mg/L	4 (100%)	4 (100%)
Sodium	mg/L	4 (100%)	4 (100%)
Strontium	mg/L	4 (100%)	4 (100%)
Sulphur	mg/L	4 (100%)	4 (100%)
Thallium	mg/L	4 (100%)	4 (100%)
Tin	mg/L	4 (100%)	4 (100%)
Titanium	mg/L	4 (100%)	4 (100%)
Uranium	mg/L	4 (100%)	4 (100%)
Vanadium	mg/L	4 (100%)	4 (100%)
Zinc	mg/L	4 (100%)	4 (100%)
Dissolved Metals			
Aluminum	mg/L	4 (100%)	3 (100%)
Antimony	mg/L	4 (100%)	3 (100%)
Arsenic	mg/L	4 (100%)	3 (100%)
Barium	mg/L	3 (75%)	3 (100%)
Beryllium	mg/L	4 (100%)	3 (100%)
Bismuth	mg/L	4 (100%)	3 (100%)
Boron	mg/L	4 (100%)	3 (100%)
Cadmium	mg/L	4 (100%)	-
Calcium	mg/L	4 (100%)	4 (100%)
Chromium	mg/L	4 (100%)	3 (100%)
Cobalt	mg/L	4 (100%)	3 (100%)
Copper	mg/L	4 (100%)	3 (100%)
Iron	mg/L	4 (100%)	3 (100%)
Lead	mg/L	4 (100%)	3 (100%)
Lithium	mg/L	4 (100%)	3 (100%)
Magnesium	mg/L	4 (100%)	4 (100%)
Manganese	mg/L	4 (100%)	3 (100%)
Mercury	mg/L	4 (100%)	-
Molybdenum	mg/L	4 (100%)	2 (66.7%)
Nickel	mg/L	4 (100%)	3 (100%)
Potassium	mg/L	4 (100%)	4 (100%)
Selenium	mg/L	4 (100%)	3 (100%)
Silicon	mg/L	4 (100%)	3 (100%)
Silver	mg/L	4 (100%)	3 (100%)
Sodium	mg/L	3 (75%)	4 (100%)
Strontium	mg/L	4 (100%)	3 (100%)
Sulphur	mg/L	4 (100%)	3 (100%)
Thallium	mg/L	4 (100%)	3 (100%)
Tin	mg/L	4 (100%)	3 (100%)
Titanium	mg/L	4 (100%)	3 (100%)
Uranium	mg/L	4 (100%)	3 (100%)
Vanadium	mg/L	4 (100%)	3 (100%)
Zinc	mg/L	4 (100%)	-

Notes: Only analytes with at least one result > Laboratory Reporting Limit (LRL) were displayed. Four field blank and four trip blank samples were collected in 2022. "-" = no data available.

Table B.5: Field Blank Evaluation for Selenium Speciation Analyses, LCO LAEMP, 2022

Parameter	Units	Range of LRLs	No. Field Blank Results > LRL
Se(VI) - Selenate	mg/L	0.01	2 (50%)

Notes: LRL = Laboratory Reporting Limit. Four field blank samples were collected in 2022. Only analytes with at least one blank results > LRL were displayed.

Table B.6: Comparisons of Water Chemistry Duplicates, LCO LAEMP, 2022

Parameter	Unit	RG_LISP24_WS_LAEMP_LCO_2022-12_N	RG_RIVER_WS_LAEMP_LCO_2022-12_N	RPD (%)	RG_LCUT_WS_LAEMP_LCO_2022-09_N	RG_RIVER_WS_LAEMP_LCO_2022-09_N	RPD (%)	RG_LILC3_WS_LAEMP_LCO_2022-07_N	RG_RIVER_WS_LAEMP_LCO_2022-07_NP	RPD (%)	RG_SLINE_WS_LAEMP_LCO_2022-04_NP	RG_RIVER_WS_LAEMP_LCO_2022-04_NP	RPD (%)
Physical Tests													
Conductivity	µS/cm	930	927	0.323	990	986	0.405	665	668	0.450	324	325	0.308
Acidity (as $CaCO_3$)	mg/L	<2.0	<2.0	0	<2.0	<2.0	0	<2.0	<2.0	0	<2.0	<2.0	0
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	189	184	2.68	225	231	2.63	184	182	1.09	138	135	2.20
Alkalinity, Bicarbonate (as HCO_3)	mg/L	231	225	2.63	274	282	2.88	224	222	0.897	168	165	1.80
Alkalinity, Carbonate (as CO_3)	mg/L	8	8.5	6.06	<1.0	<1.0	0	<1.0	<1.0	0	3.2	3.4	6.06
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	13.4	14.2	5.80	<1.0	<1.0	0	<1.0	<1.0	0	5.4	5.6	3.64
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	<1.0	<1.0	0	<1.0	<1.0	0	<1.0	<1.0	0	<1.0	<1.0	0
Alkalinity, Hydroxide (as OH)	mg/L	<1.0	<1.0	0	<1.0	<1.0	0	<1.0	<1.0	0	<1.0	<1.0	0
Alkalinity, Total (as $CaCO_3$)	mg/L	203	199	1.99	225	231	2.63	184	182	1.09	143	141	1.41
Hardness (as $CaCO_3$), Dissolved	mg/L	508	531	4.43	540	535	0.930	375	370	1.34	183	182	0.548
Oxidation-Reduction Potential (ORP)	mV	413	416	0.724	283	281	0.709	446	386	14.4	358	348	2.83
pH	pH units	8.41	8.41	0	8.22	8.21	0.122	8.04	8.04	0	201	194	3.54
Solids, Total Dissolved (TDS)	mg/L	678	672	0.889	761	743	2.39	496	488	1.63	3.2	8.9	94.2
Solids, Total Suspended (TSS)	mg/L	<1.0	<1.0	0	5.4	<1.0	138	<1.0	<1.0	0	2.96	5.4	58.4
Turbidity	NTU	0.18	0.17	5.71	0.22	0.19	14.6	0.14	0.22	44.4	8.46	8.47	0.118
Anions And Nutrients													
Total Kjeldahl Nitrogen (TKN)	mg/L	1.48	0.863	52.7	1.34	<0.500	91.3	1.24	0.629	65.4	<0.0050	<0.0050	0
Ammonia, Total (as N)	mg/L	<0.0050	<0.0050	0	<0.0050	<0.0050	0	<0.0050	0.023	129	<0.050	<0.050	0
Bromide	mg/L	<0.050	<0.250	133	<0.250	<0.250	0	<0.050	<0.050	0	0.26	0.24	8.00
Chloride	mg/L	15.2	15.4	1.31	9.26	9.33	0.753	5.24	5.12	2.32	0.293	0.296	1.02
Fluoride	mg/L	0.198	0.201	1.50	0.21	0.218	3.74	0.183	0.176	3.90	0.087	0.068	24.5
Nitrate (as N)	mg/L	8.5	8.7	2.33	14.2	14.3	0.702	7.51	7.47	0.534	0.0742	0.0658	12.0
Nitrite (as N)	mg/L	0.0021	<0.0050	81.7	<0.0050	<0.0050	0	0.0022	0.0025	12.8	0.0011	<0.0010	9.52
Orthophosphate, Dissolved (as P)	mg/L	0.0022	0.0022	0	0.0023	0.0032	32.7	<0.0010	<0.0010	0	<0.0010	<0.0010	0
Phosphorus, Total	mg/L	0.0031	0.0021	38.5	0.0028	0.0022	24.0	0.0024	0.0023	4.26	0.0095	0.0088	7.65
Sulfate (as SO_4)	mg/L	296	305	3.00	308	307	0.325	170	168	1.18	37	37.2	0.539
Organic / Inorganic Carbon													
Carbon, Dissolved Organic (DOC)	mg/L	<0.50	<0.50	0	<0.50	<0.50	0	<0.50	<0.50	0	1.98	1.09	58.0
Carbon, Total Organic (TOC)	mg/L	<0.50	<0.50	0	<0.50	<0.50	0	<0.50	<0.50	0	1.92	0.95	67.6

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: LRL = Laboratory Reporting Limit. If one result in a duplicate pair was below the LRL, RPD was calculated using the LRL in place of the value below detection results. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated.

Table B.6: Comparisons of Water Chemistry Duplicates, LCO LAEMP, 2022

Parameter	Unit	RG_LISP24_WS_LAEMP_LCO_2022-12_N	RG_RIVER_WS_LAEMP_LCO_2022-12_N	RPD (%)	RG_LCUT_WS_LAEMP_LCO_2022-09_N	RG_RIVER_WS_LAEMP_LCO_2022-09_N	RPD (%)	RG_LILC3_WS_LAEMP_LCO_2022-07_N	RG_RIVER_WS_LAEMP_LCO_2022-07_NP	RPD (%)	RG_SLINE_WS_LAEMP_LCO_2022-04_NP	RG_RIVER_WS_LAEMP_LCO_2022-04_NP	RPD (%)
Total Metals													
Aluminum	mg/L	0.0042	0.003	33.3	0.0044	0.005	12.8	0.0038	0.0046	19.0	0.0443	0.0528	17.5
Antimony	mg/L	0.00026	0.00026	0	0.00033	0.00034	2.99	0.00028	0.0003	6.90	<0.00010	<0.00010	0
Arsenic	mg/L	0.00013	0.00012	8.00	0.00013	0.00017	26.7	0.00013	0.00014	7.41	0.00016	0.00017	6.06
Barium	mg/L	0.0569	0.0552	3.03	0.0542	0.055	1.47	0.0338	0.0328	3.00	0.0392	0.0408	4.00
Beryllium	µg/L	<0.020	<0.020	0	<0.020	<0.020	0	<0.020	<0.020	0	<0.020	<0.020	0
Bismuth	mg/L	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Boron	mg/L	0.015	0.015	0	0.02	0.021	4.88	0.013	0.013	0	<0.010	<0.010	0
Cadmium	µg/L	0.171	0.16	6.65	0.514	0.508	1.17	0.485	0.46	5.29	0.021	0.0199	5.38
Calcium	mg/L	121	120	0.830	114	114	0	81.5	84.3	3.38	49.1	48.5	1.23
Chromium	mg/L	0.00015	0.00012	22.2	0.0002	0.00011	58.1	0.00014	0.00014	0	0.00022	0.00023	4.44
Cobalt	µg/L	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
Copper	mg/L	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Iron	mg/L	0.016	0.017	6.06	<0.010	<0.010	0	<0.010	<0.010	0	0.045	0.052	14.4
Lead	mg/L	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0	0.000052	0.000057	9.17
Lithium	mg/L	0.0504	0.0499	0.997	0.0734	0.0717	2.34	0.0369	0.0379	2.67	0.0039	0.0038	2.60
Magnesium	mg/L	62.2	61.7	0.807	57.6	58.2	1.04	37	38	2.67	14.8	15.3	3.32
Manganese	mg/L	0.00875	0.00933	6.42	0.0002	0.00015	28.6	0.00254	0.00243	4.43	0.00236	0.00258	8.91
Mercury	mg/L	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	0.00078	0.00086	9.76
Molybdenum	mg/L	0.00302	0.00311	2.94	0.00176	0.00171	2.88	0.00172	0.00165	4.15	0.000954	0.000984	3.10
Nickel	mg/L	0.00642	0.00647	0.776	0.0125	0.0125	0	0.00898	0.0087	3.17	<0.00050	<0.00050	0
Potassium	mg/L	1.72	1.7	1.17	1.83	1.83	0	1.5	1.47	2.02	0.402	0.413	2.70
Selenium	µg/L	41.5	42.6	2.62	62.4	62.7	0.480	43.5	42.6	2.09	1.22	1.27	4.02
Silicon	mg/L	2.32	2.24	3.51	2.24	2.26	0.889	2.18	2.04	6.64	2.18	2.27	4.04
Silver	mg/L	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Sodium	mg/L	9.41	9.47	0.636	10.1	10	0.995	5.56	5.66	1.78	0.817	0.819	0.244
Strontium	mg/L	0.212	0.222	4.61	0.244	0.24	1.65	0.182	0.174	4.49	0.159	0.162	1.87
Sulfur	mg/L	118	116	1.71	112	111	0.897	65	65.4	0.613	14	14.4	2.82
Thallium	mg/L	<0.000010	<0.000010	0	0.000018	0.000019	5.41	0.000013	0.000014	7.41	<0.000010	<0.000010	0
Tin	mg/L	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Titanium	mg/L	<0.00030	<0.00030	0	<0.00030	<0.00030	0	<0.00030	<0.00030	0	<0.00090	0.00094	0.805
Uranium	mg/L	0.00433	0.00426	1.63	0.00391	0.00401	2.53	0.00307	0.003	2.31	0.00144	0.00147	2.06
Vanadium	mg/L	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Zinc	mg/L	0.0053	0.006	12.4	0.0204	0.0206	0.976	0.0209	0.0193	7.96	0.0034	0.0039	13.7

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: LRL = Laboratory Reporting Limit. If one result in a duplicate pair was below the LRL, RPD was calculated using the LRL in place of the value below detection results. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated.

Table B.6: Comparisons of Water Chemistry Duplicates, LCO LAEMP, 2022

Parameter	Unit	RG_LISP24_WS_LAEMP_LCO_2022-12_N	RG_RIVER_WS_LAEMP_LCO_2022-12_N	RPD (%)	RG_LCUT_WS_LAEMP_LCO_2022-09_N	RG_RIVER_WS_LAEMP_LCO_2022-09_N	RPD (%)	RG_LILC3_WS_LAEMP_LCO_2022-07_N	RG_RIVER_WS_LAEMP_LCO_2022-07_NP	RPD (%)	RG_SLINE_WS_LAEMP_LCO_2022-04_NP	RG_RIVER_WS_LAEMP_LCO_2022-04_NP	RPD (%)
Dissolved Metals													
Aluminum	mg/L	<0.0010	<0.0010	0	<0.0010	<0.0010	0	0.0025	0.0011	77.8	0.0021	0.0014	40.0
Antimony	mg/L	0.00025	0.00025	0	0.00036	0.00035	2.82	0.00028	0.00028	0	<0.00010	<0.00010	0
Arsenic	mg/L	0.00013	<0.00010	26.1	<0.00010	<0.00010	0	0.00011	0.00011	0	0.00012	0.00011	8.70
Barium	mg/L	0.0528	0.0574	8.35	0.0573	0.0578	0.869	0.031	0.0315	1.60	0.0386	0.0379	1.83
Beryllium	µg/L	<0.020	<0.020	0	<0.020	<0.020	0	<0.020	<0.020	0	<0.020	<0.020	0
Bismuth	mg/L	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Boron	mg/L	0.015	0.015	0	0.019	0.02	5.13	0.013	0.013	0	<0.010	<0.010	0
Cadmium	µg/L	0.168	0.159	5.50	0.53	0.554	4.43	0.474	0.476	0.421	0.0138	0.0137	0.727
Calcium	mg/L	112	115	2.64	118	117	0.851	85.4	84.5	1.06	49.1	49	0.204
Chromium	mg/L	<0.00010	0.00016	46.2	0.00012	0.00012	0	0.00012	0.00012	0	0.00016	0.00016	0
Cobalt	µg/L	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
Copper	mg/L	0.00021	0.0002	4.88	0.00034	0.0004	16.2	0.00055	0.00048	13.6	0.00043	<0.00020	73.0
Iron	mg/L	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
Lead	mg/L	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Lithium	mg/L	0.0482	0.0498	3.27	0.0712	0.0724	1.67	0.0378	0.0389	2.87	0.0039	0.0038	2.60
Magnesium	mg/L	55.5	59.2	6.45	59.5	59	0.844	39.2	38.5	1.80	14.6	14.5	0.687
Manganese	mg/L	0.00627	0.0068	8.11	0.00012	0.00013	8.00	0.00209	0.00207	0.962	0.00013	0.00011	16.7
Mercury	mg/L	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Molybdenum	mg/L	0.00305	0.00308	0.979	0.00184	0.00181	1.64	0.00171	0.00171	0	0.00116	0.00104	10.9
Nickel	mg/L	0.00566	0.00604	6.50	0.0121	0.0124	2.45	0.0086	0.00879	2.19	<0.00050	<0.00050	0
Potassium	mg/L	1.54	1.69	9.29	1.84	1.81	1.64	1.41	1.4	0.712	0.394	0.383	2.83
Selenium	µg/L	49.2	49	0.407	72.8	71.9	1.24	41.3	40.9	0.973	1.19	1.16	2.55
Silicon	mg/L	2.26	2.31	2.19	2.29	2.2	4.01	1.93	1.92	0.519	2.02	2.09	3.41
Silver	mg/L	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Sodium	mg/L	8.56	9.27	7.96	9.78	9.83	0.510	5.65	5.45	3.60	0.793	0.78	1.65
Strontium	mg/L	0.208	0.216	3.77	0.254	0.249	1.99	0.174	0.174	0	0.156	0.157	0.639
Sulfur	mg/L	134	127	5.36	110	106	3.70	58.7	58	1.20	13.5	13.7	1.47
Thallium	mg/L	<0.000010	<0.000010	0	0.00002	0.000021	4.88	0.000014	0.000013	7.41	<0.000010	<0.000010	0
Tin	mg/L	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Titanium	mg/L	<0.00030	<0.00030	0	<0.00030	<0.00030	0	<0.00030	<0.00030	0	<0.00030	<0.00030	0
Uranium	mg/L	0.00413	0.00419	1.44	0.00413	0.00412	0.242	0.00296	0.00291	1.70	0.00136	0.00137	0.733
Vanadium	mg/L	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Zinc	mg/L	0.0052	0.0055	5.61	0.022	0.0214	2.76	0.0192	0.0198	3.08	0.0036	0.002	57.1

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: LRL = Laboratory Reporting Limit. If one result in a duplicate pair was below the LRL, RPD was calculated using the LRL in place of the value below detection results. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated.

suspended solids, and three RPDs for total Kjeldahl nitrogen (Table B.6). Of the above RPDs, several resulted from one concentration in the pair being below the LRL, where greater variability is expected. As a relatively low percentage of RPDs were greater than 30% and most of those analytes were of low concern in regard to data interpretation, field sampling precision was considered good.

Four sets of field duplicate samples were collected to assess field sampling precision for selenium speciation (Table B.7). RPDs could not be calculated for several selenium speciation duplicate samples as the analyte concentrations in both samples were below the LRL. Of the 20 comparisons that could be calculated, three did not meet the DQO of 30% (methylseleninic acid; Table B.7). Greater variability was expected with this comparison since one sample concentration in one duplicate sample set was below the LRL. As these results only represent 15.0% of field duplicate comparisons, field sampling precision was overall considered good. However, as these results represent 75.0% of comparisons for methylseleninic acid, variation in sampling will be taken into account during data interpretation for methylseleninic acid.

Overall, as very few calculable RPDs exceeded the DQO of 30%, laboratory and field precision were considered acceptable.

B2.4 Data Accuracy

Data accuracy within the ALS laboratory reports was evaluated based on results of 335 Laboratory Control Samples (LCS) and 42 Matrix Spike (MS) samples (Appendix H). All 1,470 LCS analyte results and 1,283 MS analyte results met the laboratory DQO. Recovery could not be calculated in several MS samples as background levels were greater than or equal to the initial spike concentration. However, as several other QC tests were successful and matrix spike issues due to high background presence is not uncommon, MS recovery not being calculable in several MS samples was not of great concern. Overall, the accuracy achieved by the laboratory in this study was considered good.

Data accuracy within the BAL laboratory reports was evaluated based on results of 19 LCS, 14 MS samples, 14 Matrix Spike Duplicate (MSD) samples, and 14 Reference Material (RM) samples (Appendix H). All 39 LCS, 26 MS, 26 MSD, and 14 RM individual analyte results met the laboratory DQO. Therefore, the accuracy achieved by the laboratory in this study was considered excellent.

B2.5 Hold Times

Table B.7: Comparisons of Selenium Speciation Duplicates, LCO LAEMP, 2022

Parameter	Unit	RG_SLINE_WS_LAEMP_LCO_2022-04_NP	RG_RIVER_WS_LAEMP_LCO_2022-04_NP	RPD (%)	RG_LILC3_WS_LAEMP_LCO_2022-07_NP_NAL	RG_RIVER_WS_LAEMP_LCO_2022-07_NP_NAL	RPD (%)	RG_LCUT_WS_LAEMP_LCO_2022-09_N	RG_RIVER_WS_LAEMP_LCO_2022-09_NP	RPD (%)	RG_LISP24_WS_LCO_2022-12_N_	RG_RIVER_WS_LCO_2022-12_NP	RPD (%)
Total Selenium	µg/L	1.19	1.37	14.1	34.5	35.8	3.7	60.8	61.2	0.7	31.9	34.2	6.96
Dissolved Selenium	µg/L	1.14	1.18	3.45	35.2	35.1	0.28	61.2	64.5	5.25	33	33.3	0.905
Dimethylselenoxide	µg/L	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
MeSe(IV) - Methylseleninic Acid	µg/L	<0.01	<0.01	0	0.004	0.006	40.0	0.007	<0.01	35.3	0.007	0.01	35.3
Methaneselenonic Acid	µg/L	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	0.016	0.016	0
Se(IV) - Selenite	µg/L	0.031	0.028	10.2	0.068	0.079	15.0	0.083	0.077	7.5	0.193	0.202	4.56
Se(VI) - Selenate	µg/L	1.03	1.01	1.96	30.5	33.2	8.48	63	56.7	10.5	28.7	31.8	10.2
SeCN - Selenocyanate	µg/L	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
SeMe - Selenomethionine	µg/L	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Selenosulfate	µg/L	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Unknown Selenium Species	µg/L	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: LRL = Laboratory Reporting Limit. If one result in a duplicate pair was below the LRL, RPD was calculated using the LRL in place of the value below detection results. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated.

The recommended hold times for pH and oxidation-reduction potential (ORP) analyses (0.25 hrs) were exceeded in all samples collected. As *in situ* pH was used for data interpretation, these pH exceedances had no impact on data interpretability. Additionally, ORP is not used a great extent in any analyses. The hold time for turbidity was exceeded by one day in one sample and by two days in five samples. Hold times for dissolved orthophosphate and nitrite were exceeded by one day in one and two samples, respectively, and by two days in five samples. The hold time for nitrate was exceeded by one day in two samples, by two days in seven samples, and by one day in three samples. None of the above hold time exceedances are expected to impact conclusions derived from the data but will still be taken into consideration during data interpretation. All hold times were met for selenium speciation samples. Overall, few samples exceeded hold times, and thus hold time exceedances are expected to have little effect on the interpretation of results.

B2.6 Other Concerns

Total Kjeldahl nitrogen (TKN) concentrations in several water samples may have been biased low due to high nitrate concentrations (see laboratory reports CG2212276, CG2212408, CG2212665, and CG2212821 in Appendix H). As a result of this, 12 TKN results were below the LRL, which impacted the RPD calculated between two of the field duplicate sample pairs (Table B.6). Overall, lowered and undetectable TKN concentrations are expected to have little effect on the overall interpretation of TKN or other water chemistry results.

B2.7 Data Quality Statement

Water chemistry data collected for the 2022 Line Creek LAEMP were of acceptable quality as characterized by good detectability, appropriate LRLs, minimal evidence of laboratory or field contamination, good laboratory and field precision and accuracy, and few hold time exceedances. Some TKN samples were biased low due to high concentration of nitrate, and this will be considered during data interpretation. Overall, the associated data from ALS and BAL can be used with a high level of confidence in the derivation of conclusions.

B3 BENTHIC INVERTEBRATE COMMUNITY

B3.1 Sub-Sampling Proportions, Precision, and Accuracy

The analytical reports from Cordillera Consulting Inc. (benthic invertebrate community structure; Appendix H) were examined to assess sub-sampling accuracy. For all samples, Canadian Aquatic Biomonitoring Network (CABIN) protocols were followed for sub-sampling (i.e., identification of a minimum 300 invertebrates), with a minimum of 5% of a sample being assessed. All 30 benthic invertebrate community structure samples were subsampled (Table B.8). The proportion of sub-sampled material ranged from 5 to 20% of the total sample material. Both the precision and accuracy of the sub-samples randomly chosen for sub-sample assessment (n = 3) met the DQO in all sub-samples (20%; Table B.9). Thus, the precision and accuracy for sub-sampling of the benthic invertebrate community samples was considered excellent.

B3.2 Organism Sorting Efficiency

To measure the effectiveness of the sorters, at least 10% of samples were selected at random for resorting analysis by a different sorter (n = 3). Sorting efficiency (i.e., percent recovery) of benthic invertebrate samples was excellent, achieving an average of 100% for the three community structure samples evaluated (Table B.10). Recovery in quality control samples was above the laboratory's DQO (95%), and thus organism sorting efficiency was considered excellent.

B3.3 Taxonomic Identification Accuracy

Cordillera Consulting Inc. performed an internal audit of taxonomic identification for at least 10% of all community structure samples (n = 3; Table B.11). The analysts reported a total identification error rate (TIR) of 0 to 0.270%, a percent difference in enumeration (PDE) of 0 to 0.321%, a percent taxonomic disagreement (PTD) of 0.270 to 0.639%, and a Bray Curtis Dissimilarity Index (BCDI [which is a measure of the differences in identifications between different analysts] of 0.003 to 0.005). The laboratory DQO was based on TIR as per CABIN laboratory methods (< 5% TIR; Environment Canada 2014). As TIR was below 5% for all samples examined, the taxonomic accuracy of the analysis was considered excellent.

B3.4 Data Quality Statement

Benthic invertebrate community data collected for the present study were of excellent quality as characterized by excellent sorting efficiency and excellent taxonomic identification accuracy. Therefore, the associated data can be used with a high level of

Table B.8: Percent of Sample Sorted and the Total Number of Benthic Invertebrates Recovered from the Sampled Fraction, LCO LAEMP, 2022

Sample ID	Laboratory ID	% Sampled	# Invertebrates
RG_FO23_BIC-1_2022-09-09_N	CC231107	5	317
RG_FO23_BIC-2_2022-09-09_N	CC231108	20	471
RG_FO23_BIC-3_2022-09-09_N	CC231109	7	327
RG_FO23_BIC-4_2022-09-09_N	CC231110	10	318
RG_FO23_BIC-5_2022-09-10_N	CC231111	5	326
RG_FRUL_BIC-1_2022-09-10_N	CC231112	6	352
RG_FRUL_BIC-2_2022-09-10_N	CC231113	8	329
RG_FRUL_BIC-3_2022-09-10_N	CC231114	8	334
RG_LCUT_BIC-1_2022-09-15_N	CC231115	5	425
RG_LCUT_BIC-2_2022-09-15_N	CC231116	5	451
RG_LCUT_BIC-3_2022-09-15_N	CC231117	5	370
RG_LIDCOM_BIC-1_2022-09-12_N	CC231118	5	1,113
RG_LIDSL_BIC-1_2022-09-13_N	CC231119	5	560
RG_LIDSL_BIC-2_2022-09-13_N	CC231120	5	351
RG_LIDSL_BIC-3_2022-09-13_N	CC231121	6	331
RG_LIDSL_BIC-4_2022-09-14_N	CC231122	6	329
RG_LIDSL_BIC-5_2022-09-14_N	CC231123	5	364
RG_LILC3_BIC-1_2022-09-08_N	CC231124	5	1,125
RG_LILC3_BIC-2_2022-09-08_N	CC231125	5	743
RG_LILC3_BIC-3_2022-09-08_N	CC231126	10	1,158
RG_SLINE_BIC-1_2022-09-16_N	CC231127	20	351
RG_SLINE_BIC-2_2022-09-16_N	CC231128	5	394
RG_SLINE_BIC-3_2022-09-16_N	CC231129	14	349
RG_LI24_BIC-1_2022-09-17_N	CC231130	9	353
RG_LI24_BIC-2_2022-09-17_N	CC231131	5	313
RG_LI24_BIC-3_2022-09-17_N	CC231132	9	364
RG_LI8_BIC-1_2022-09-17_N	CC231133	5	447
RG_LI8_BIC-2_2022-09-17_N	CC231134	10	338
RG_LI8_BIC-3_2022-09-17_N	CC231135	5	408
RG_LISP24_BIC-1_2022-09-14_N	CC231136	5	348

Table B.9: Benthic Invertebrate Community Sub-sampling Precision and Accuracy, LCO LAEMP, 2022

Station ID		Organisms in Subsample					Total	Precision Error		Accuracy Error	
Sample ID	Laboratory ID	1	2	3	4	5		Min (%)	Max (%)	Min (%)	Max (%)
RG_SLINE_BIC-1_2022-09-16_N	CC231127	355	322	313	353	311	1,654	0.6	12.4	2.7	7.3
RG_LISP24_BIC-1_2022-09-14_N	CC231136	349	340	310	335	304	1,638	1.5	12.9	2.3	7.2
RG_FO23_BIC-2_2022-09-09_N	CC231108	469	448	478	547	451	2,393	0.7	18.1	0.1	14.3
								0.90	**14.5**	**1.68**	**9.60**

Table B.10: Benthic Invertebrate Community Sorting Efficiency, LCO LAEMP, 2022

Sample ID	Laboratory ID	Number of Organisms Recovered (Initial Sort)	Number of Organisms in Re-sort	Sorting Efficiency
RG_FO23_BIC-1_2022-09-09_N	CC231107	317	0	100%
RG_LIDSL_BIC-3_2022-09-13_N	CC231121	331	1	100%
RG_SLINE_BIC-3_2022-09-16_N	CC231129	349	4	99%
			Average	**100%**

Table B.11: Percent Benthic Invertebrate Community Organism Recovery[a], LCO LAEMP, 2022

Sample ID	Laboratory ID	Percent Sampled (%)	Taxa Identified	TIR (%)	PDE (%)	PTD (%)	BCDI
RG_FO23_BIC-3_2022-09-09_N	CC231109	7	328	0	0.153	0.610	0.005
RG_LCUT_BIC-3_2022-09-15_N	CC231117	5	370	0.27	0	0.270	0.003
RG_LI24_BIC-2_2022-09-17_N	CC231131	5	311	0	0.321	0.639	0.003

Notes: TIR = Total Identification Error Rate, PDE = Percent Difference in Enumeration, PTD = Percent Taxonomic Disagreement, BCDI = Bray Curtis Dissimilarity Index to quantify differences in identifications.

[a] For error rationale and calculations, refer to Cordillera laboratory report (Appendix H).

confidence in the derivation of conclusions. Quality control procedures were not conducted on benthic invertebrate community structure and density data analyzed by Zeas.

B4 BENTHIC INVERTEBRATE TISSUE CHEMISTRY

B4.1 Laboratory Reporting Limits

Analytical reports of benthic invertebrate tissue metal concentrations from TrichAnalytics (see laboratory reports 2022-331, 2022-364, 2022-401, and 2022-453; Appendix H) were examined to provide an inventory of analyte results below the LRL and to compare the LRLs for these analytes to available benchmarks (Table B.12). All analyte concentrations were consistently above detection limits including selenium, which was the only analyte with an applicable guideline. Therefore, the achieved LRLs were appropriate for this study.

B4.2 Data Accuracy and Precision

Data accuracy and precision were evaluated based on the analysis of 13 CRM samples. All the 377 CRM results met the laboratory DQO. There were 13 titanium results that could not be calculated as the certified concentrations were too close to the reportable detection limit (see laboratory reports in Appendix H). The laboratory accuracy and precision as determined by CRM analyses was considered excellent.

Laboratory precision was also evaluated by duplicate analysis of 20 benthic invertebrate tissue samples (see laboratory reports in Appendix H). All the 498 duplicate results met the laboratory DQO. There were 81 results that were not calculated due to values below the detection limit. Therefore, laboratory precision as determined by duplicate analyses was considered excellent.

B4.3 Data Quality Statement

Benthic invertebrate tissue data collected for the 2022 LCO LAEMP were of good quality as characterized by excellent detectability, appropriate LRLs, and excellent laboratory precision and accuracy. Therefore, the associated data can be used with a good level of confidence in the derivation of conclusions for this study.

Table B.12: Evaluation of Benthic Invertebrate Tissue Laboratory Reporting Limits, LCO LAEMP, 2022

Parameter	Units	Range of LRLs	No. Sample Results < LRL
Arsenic	mg/kg dw	0.355 to 0.545	8 (5.71%)
Silver	mg/kg dw	0.001	1 (0.71%)

Notes: Only analytes with at least one result < Laboratory Reporting Limit (LRL) or LRL were above guidelines were displayed. No guidelines exist for any analyte that had at least one result below the LRL. The total number of samples in 2022 (n) was 191. mg/kg dw = milligrams per kilogram dry weight.

B5 DATA QUALITY REVIEW SUMMARY

Overall, the quality of the data collected for this project was considered acceptable for the derivation of conclusions associated with the objectives of the 2022 Line Creek LAEMP.

B6 REFERENCES

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APPENDIX C
PRODUCTIVITY

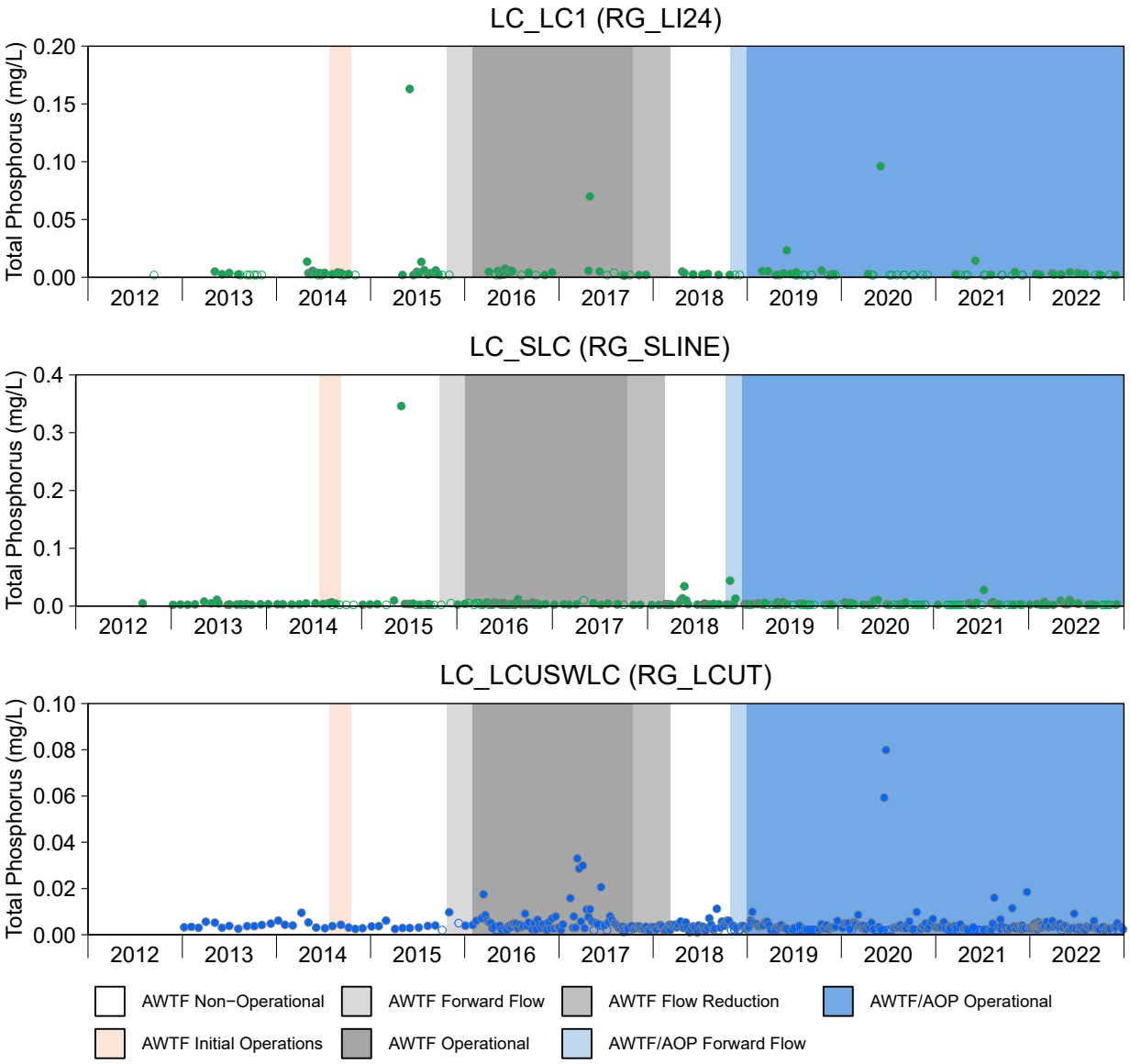
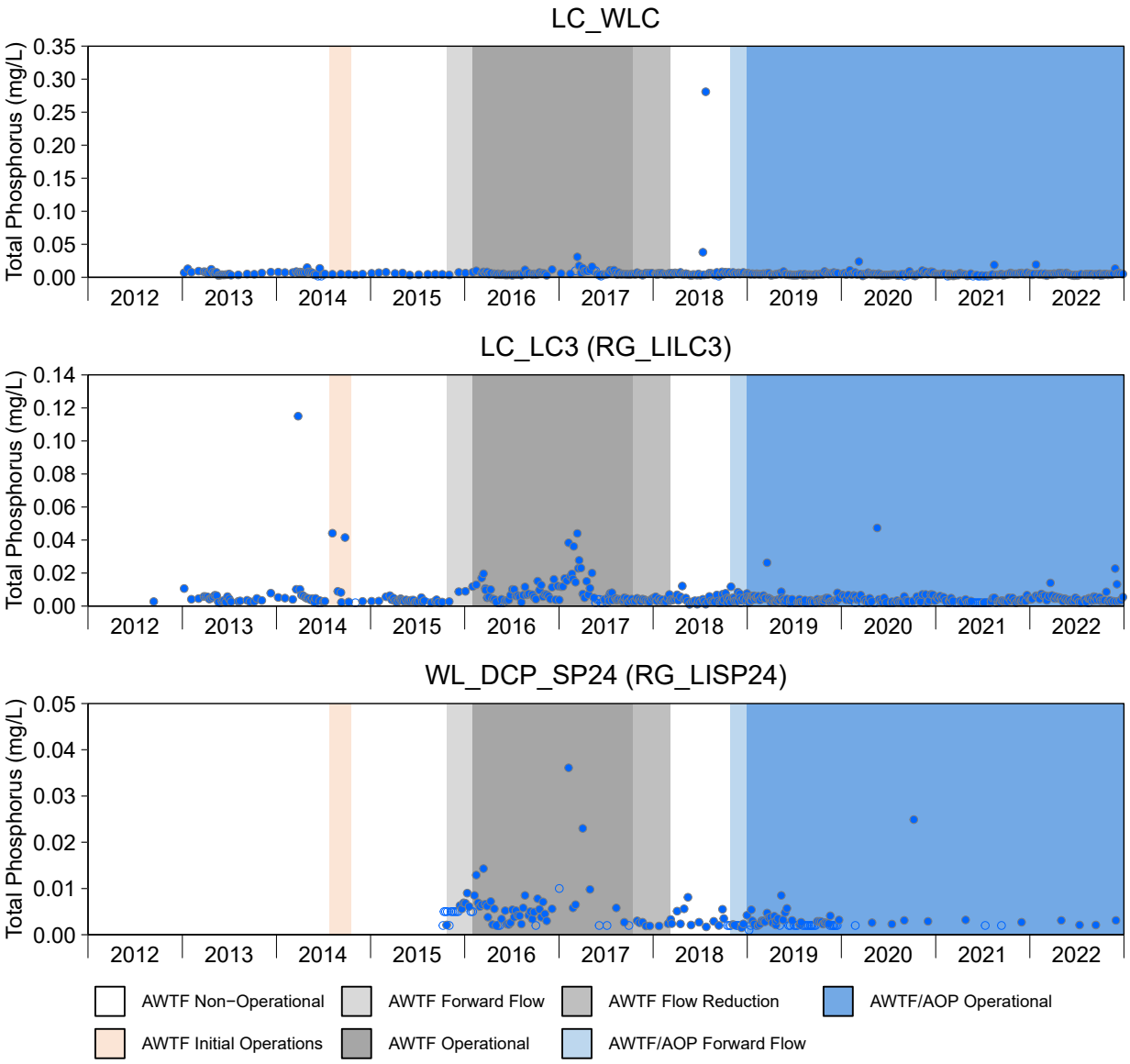


Figure C.1: Time Series Plots for Total Phosphorus from from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. High non−detect data from 2012 was removed. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. The interim screening values for total phosphorus (0.03 mg/L) and orthophosphate (0.006 mg/L) represent the 97.5th percentile of concentrations observed in reference areas over the growing season (Minnow 2020). Values with high LRLs of 0.3 mg/L in 2012 are not shown. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.



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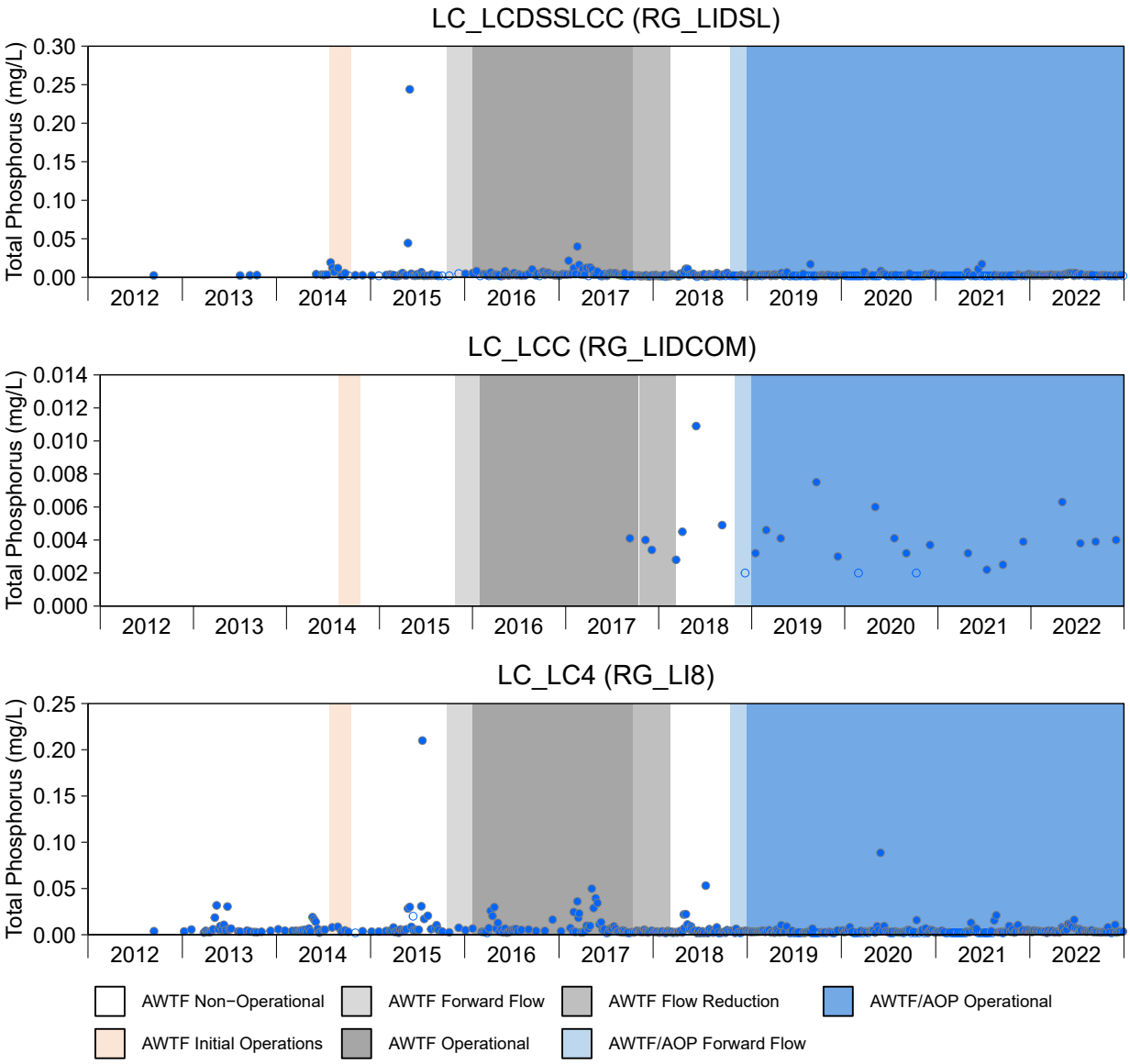

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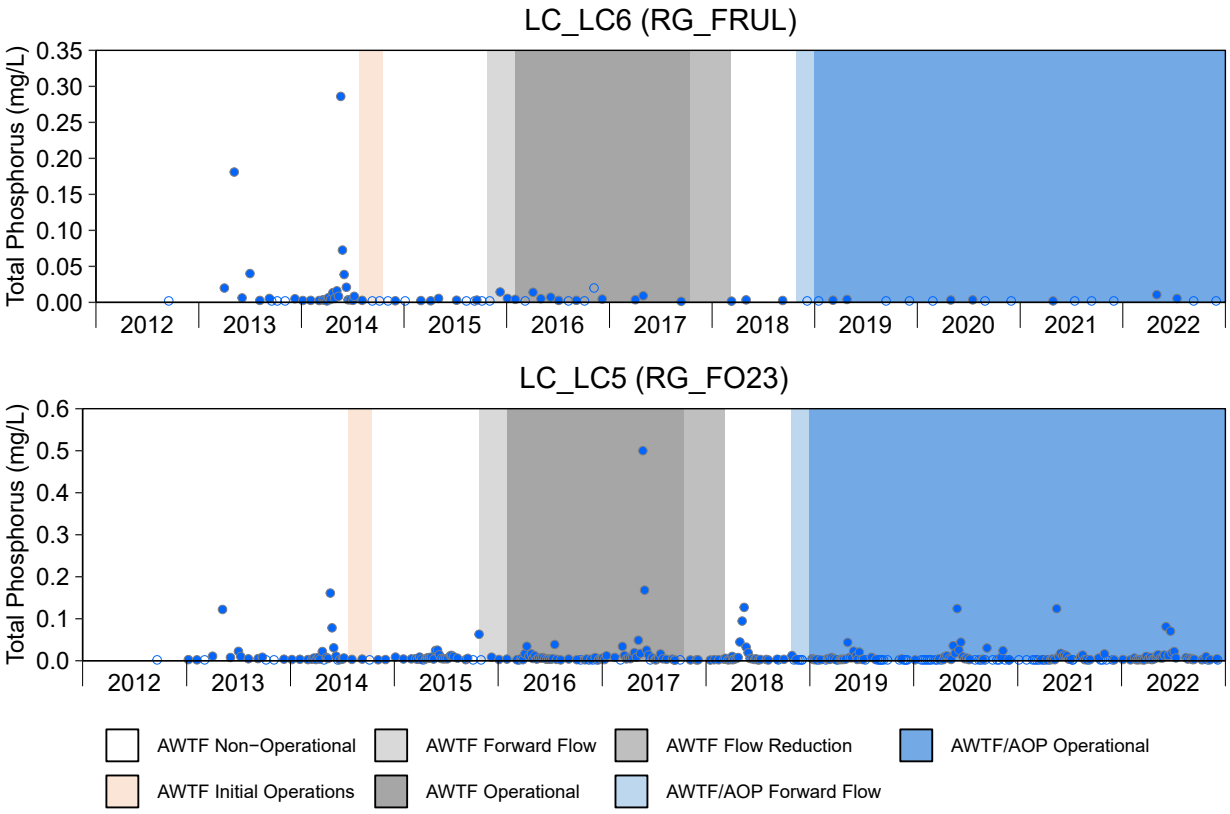

Figure C.1: Time Series Plots for Total Phosphorus from from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. High non−detect data from 2012 was removed. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. The interim screening values for total phosphorus (0.03 mg/L) and orthophosphate (0.006 mg/L) represent the 97.5th percentile of concentrations observed in reference areas over the growing season (Minnow 2020). Values with high LRLs of 0.3 mg/L in 2012 are not shown. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

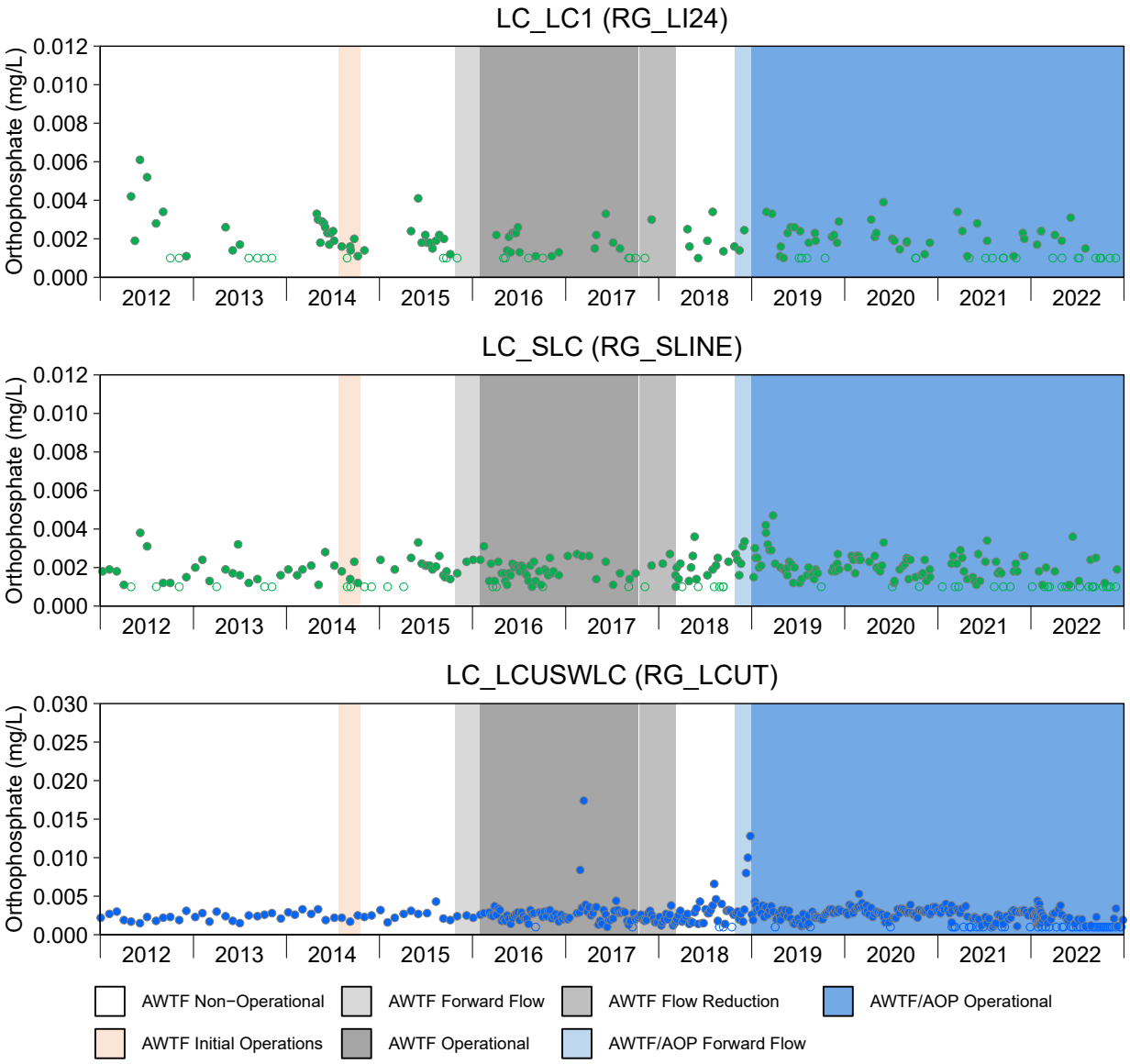

Figure C.2: Time Series Plots for Orthophosphate from from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. The interim screening values for total phosphorus (0.03 mg/L) and orthophosphate (0.006 mg/L) represent the 97.5th percentile of concentrations observed in reference areas over the growing season (Minnow 2020). Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

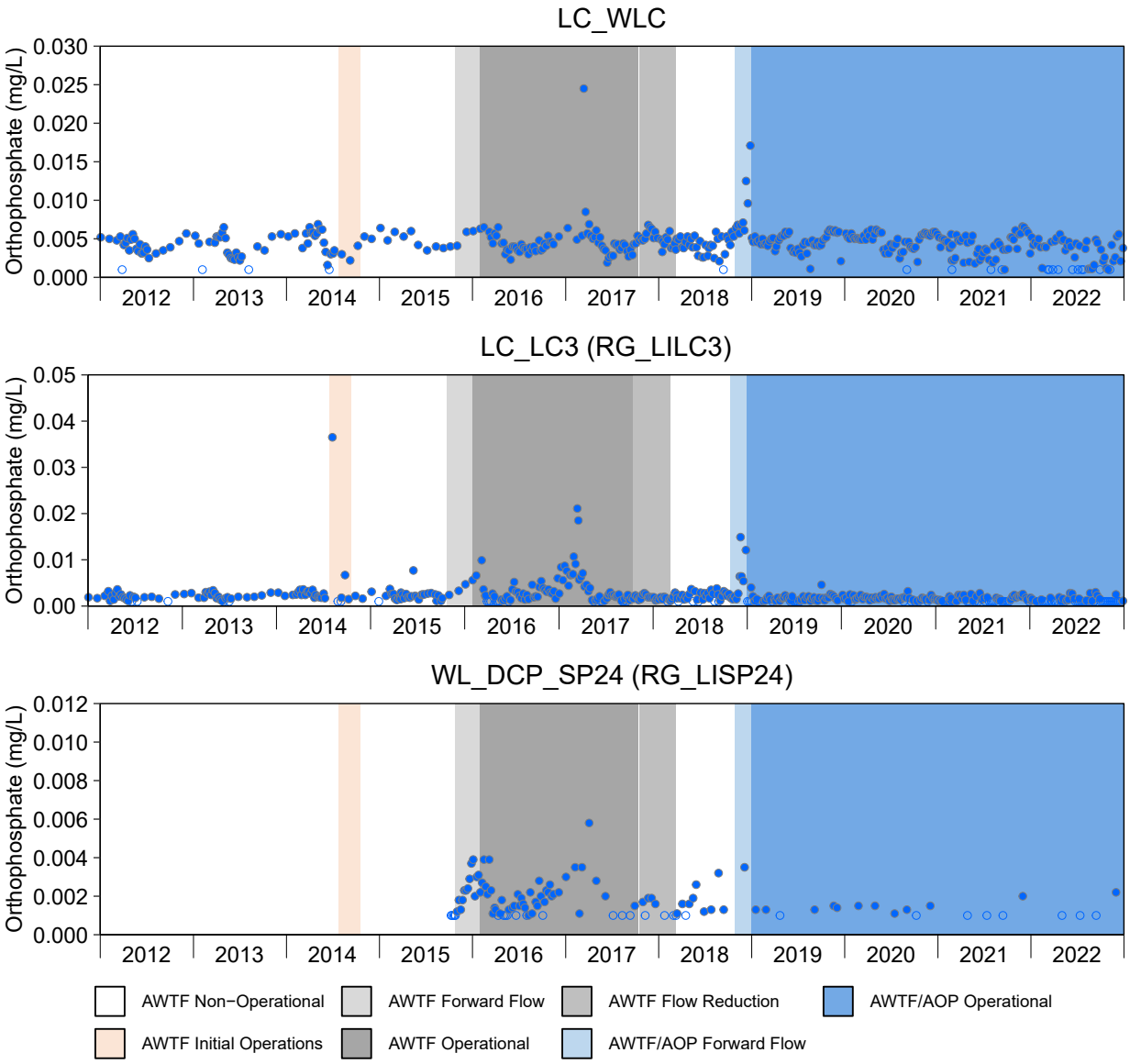

Figure C.2: Time Series Plots for Orthophosphate from from Line Creek LAEMP Sampling Areas, 2012 to 2022

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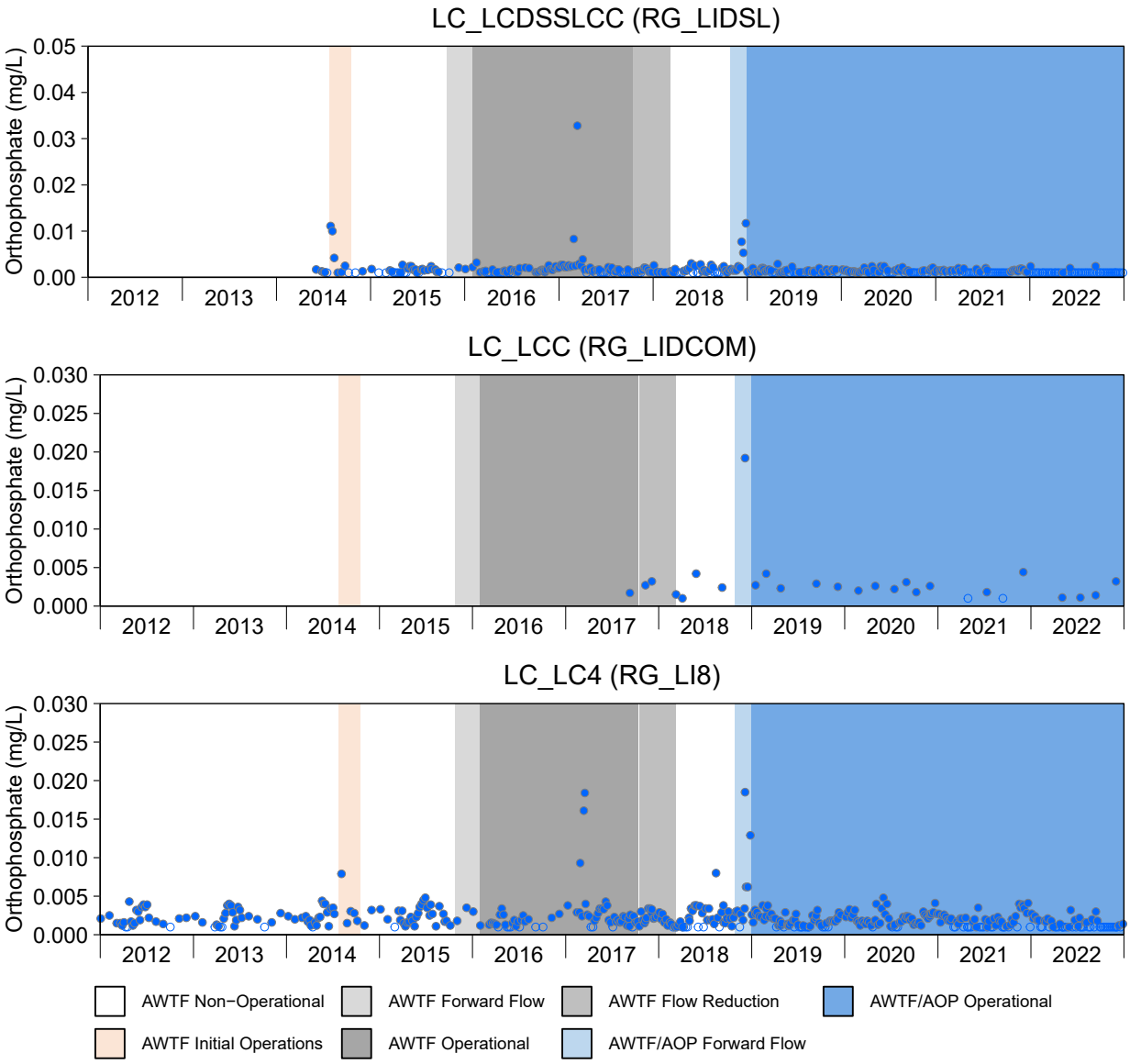

Figure C.2: Time Series Plots for Orthophosphate from from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. The interim screening values for total phosphorus (0.03 mg/L) and orthophosphate (0.006 mg/L) represent the 97.5th percentile of concentrations observed in reference areas over the growing season (Minnow 2020). Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

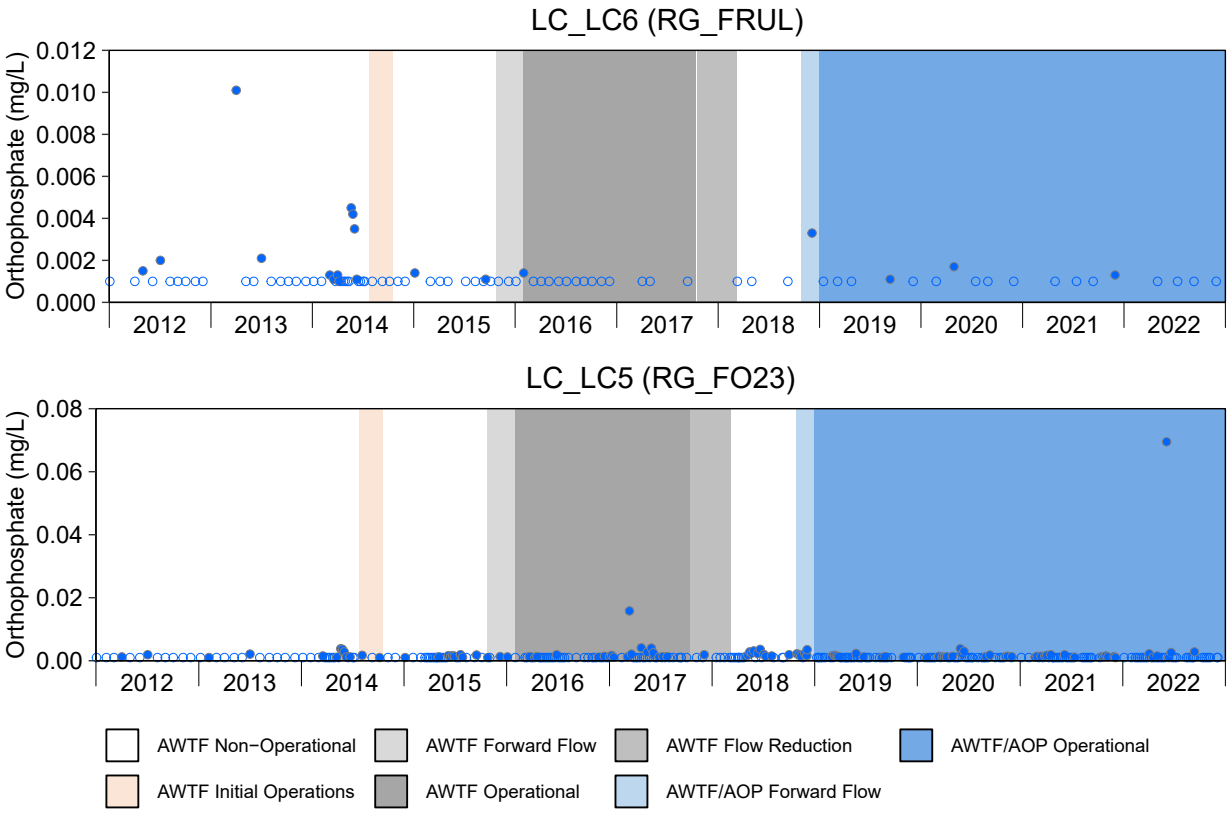

Figure C.2: Time Series Plots for Orthophosphate from from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. The interim screening values for total phosphorus (0.03 mg/L) and orthophosphate (0.006 mg/L) represent the 97.5th percentile of concentrations observed in reference areas over the growing season (Minnow 2020). Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

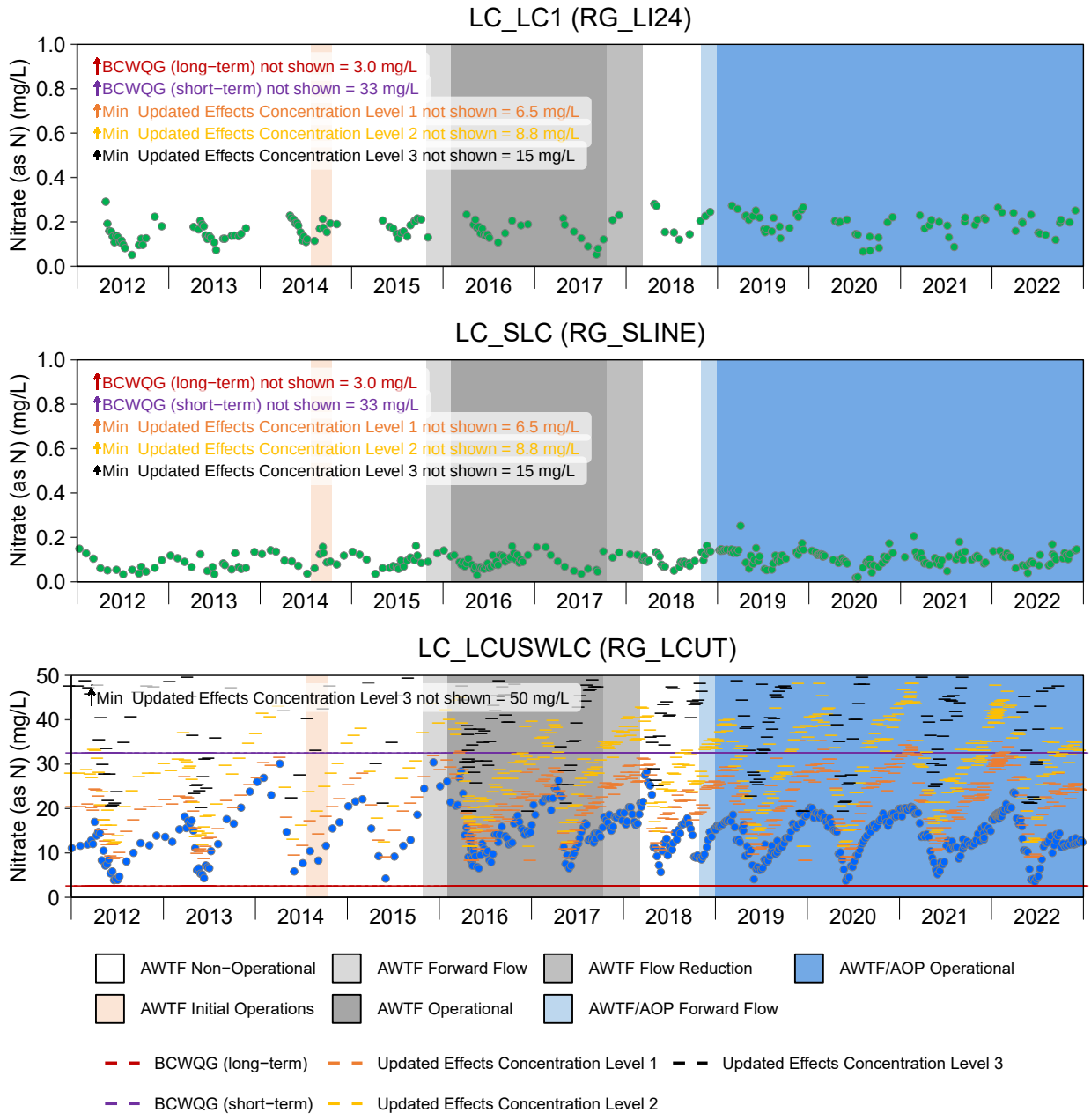

Figure C.3: Time Series Plots for Nitrate from from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

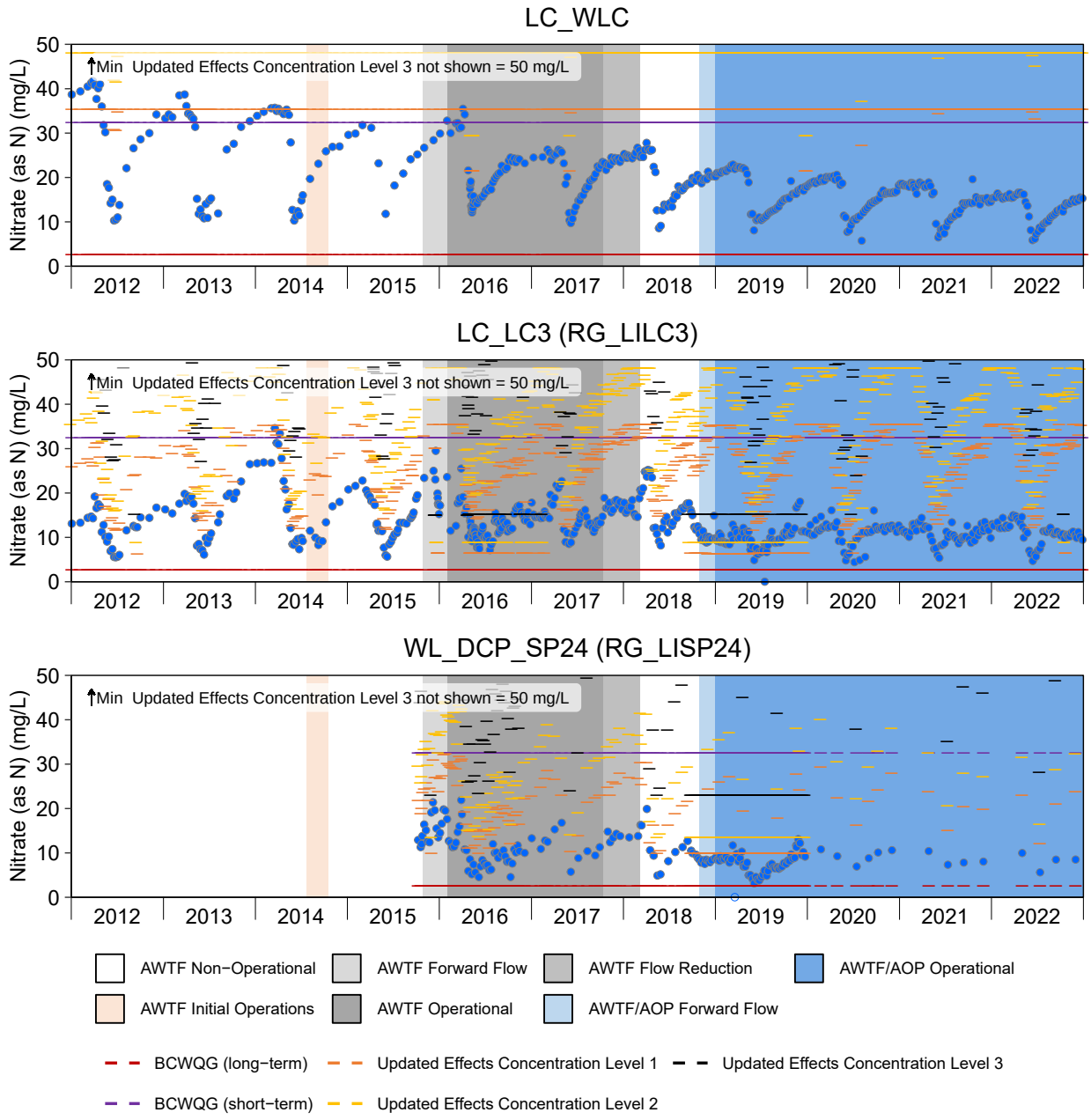

Figure C.3: Time Series Plots for Nitrate from from Line Creek LAEMP Sampling Areas, 2012 to 2022

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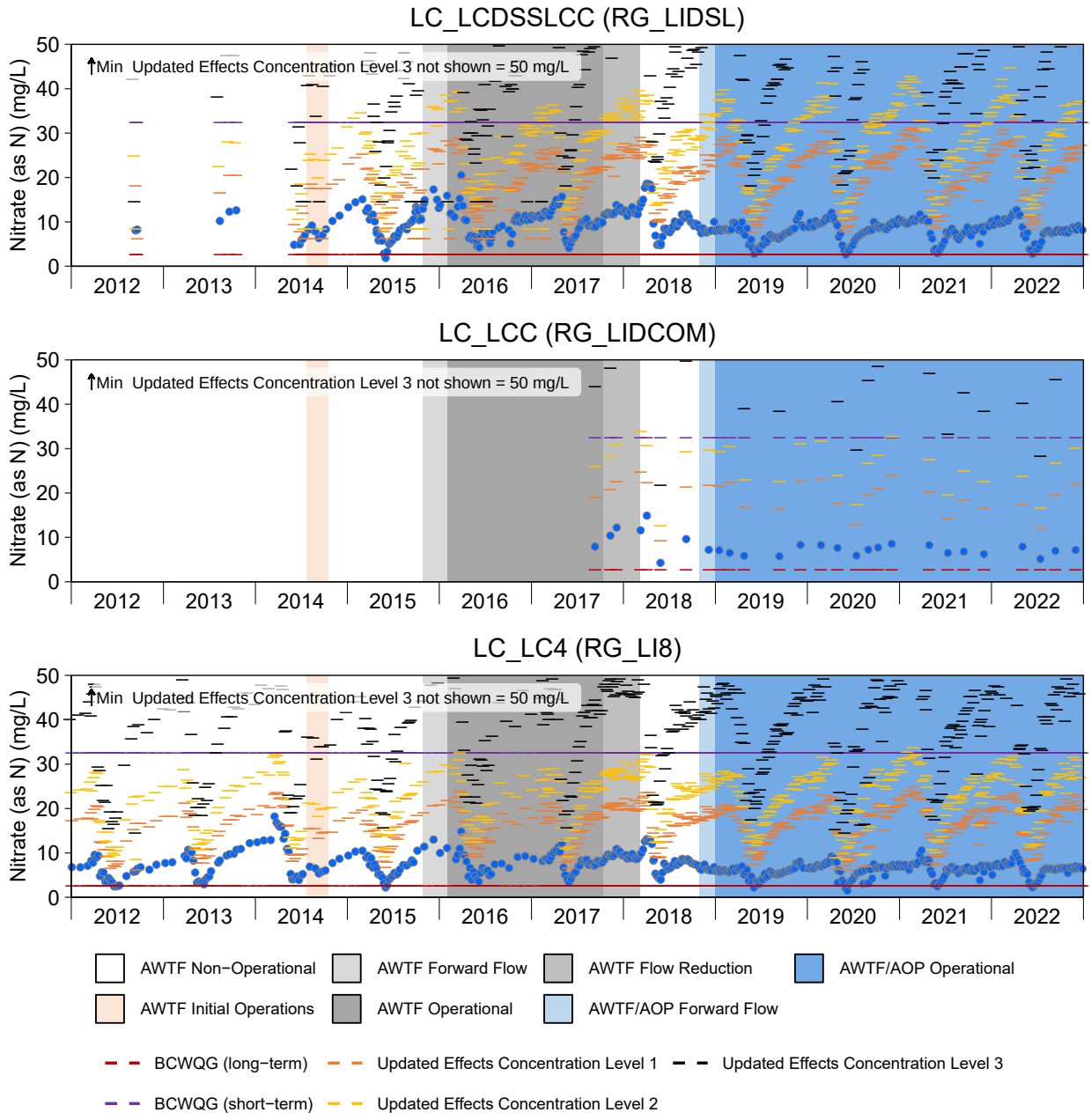

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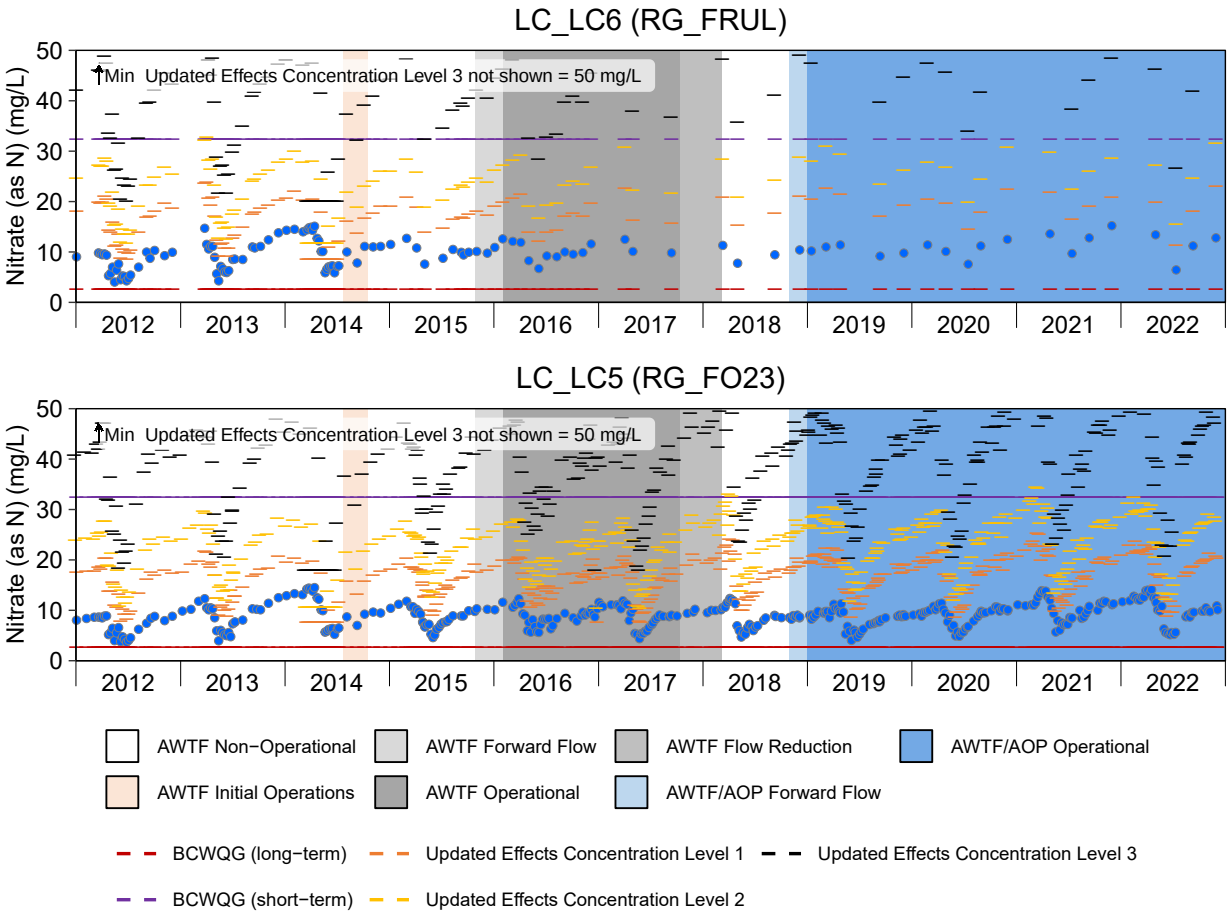

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Figure C.4: Periphyton Coverage and Site Photograph at RG_LI24 (Reference), September 2022

Note: Site photo was taken looking upstream

Figure C.4: Periphyton Coverage and Site Photograph at RG_SLINE (Reference), September 2022

Note: Site photo was taken looking upstream

Figure C.4: Periphyton Coverage and Site Photograph at RG_LCUT (Exposed), September 2022

Note: Site photo was taken looking upstream

Figure C.4: Periphyton Coverage and Site Photograph at RG_LILC3 (Exposed), September 2022

Note: Site photo was taken looking upstream

Figure C.4: Periphyton Coverage and Site Photograph at RG_LISP24 (Exposed), September 2022

Note: Site photo was taken looking upstream

Figure C.4: Periphyton Coverage and Site Photograph at RG_LIDSL (Exposed), September 2022

Note: Site photo was taken looking upstream

Figure C.4: Periphyton Coverage and Site Photograph at RG_LIDCOM (Exposed), September 2022

Note: Site photo was taken looking upstream

Figure C.4: Periphyton Coverage and Site Photograph at RG_LI8 (Exposed), September 2022

Note: Site photo was taken looking upstream

Figure C.4: Periphyton Coverage and Site Photograph at RG_FRUL (Exposed), September 2022

Note: Site photo was taken looking downstream

Figure C.4: Periphyton Coverage and Site Photograph at RG_FO23 (Exposed), September 2022

Note: Site photo was taken looking upstream

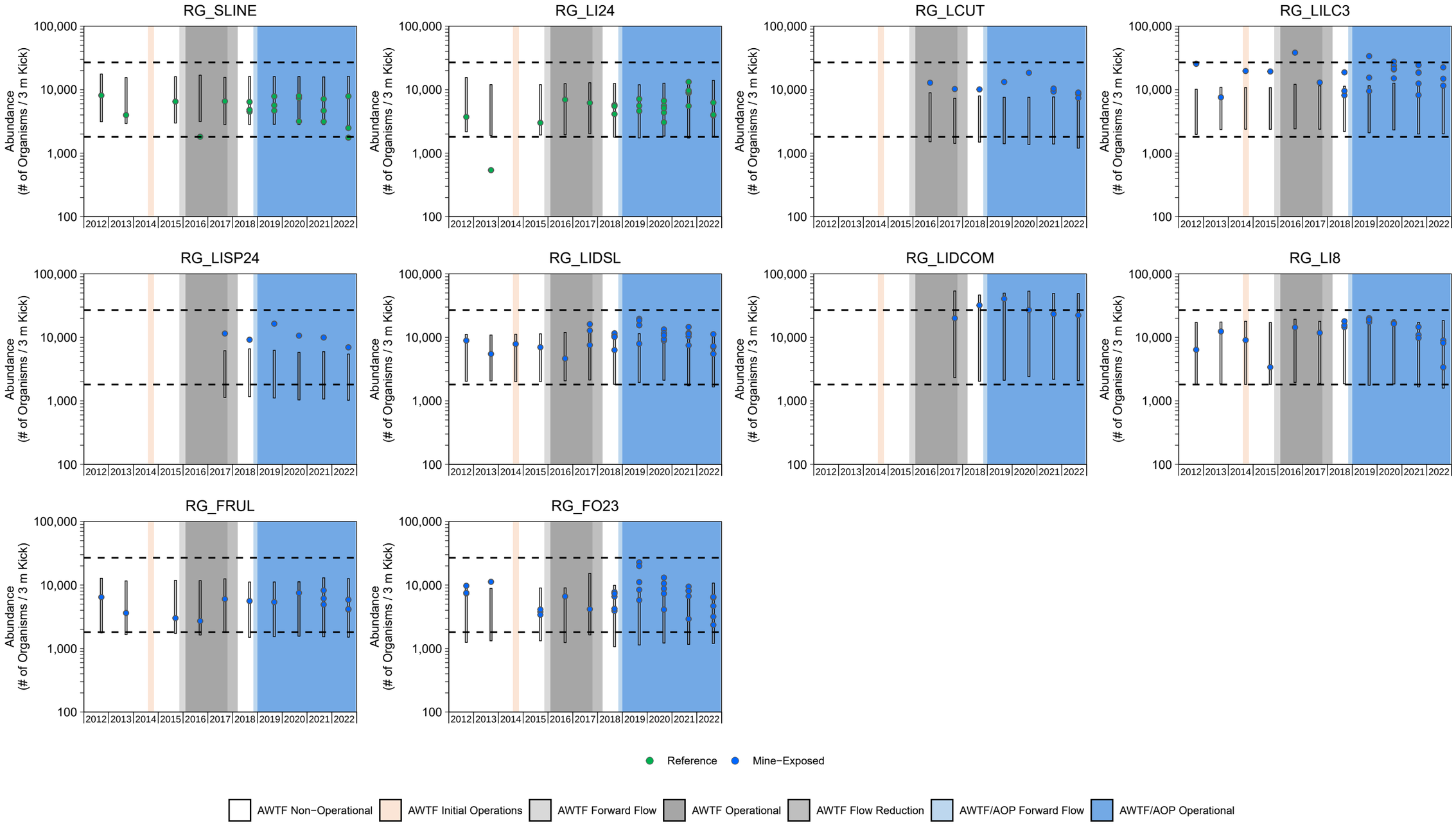


Figure C.5: Benthic Invertebrate Community Abundance (3−minute Kick and Sweep Sampling) from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown with grey shaded, black outlined rectangles (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

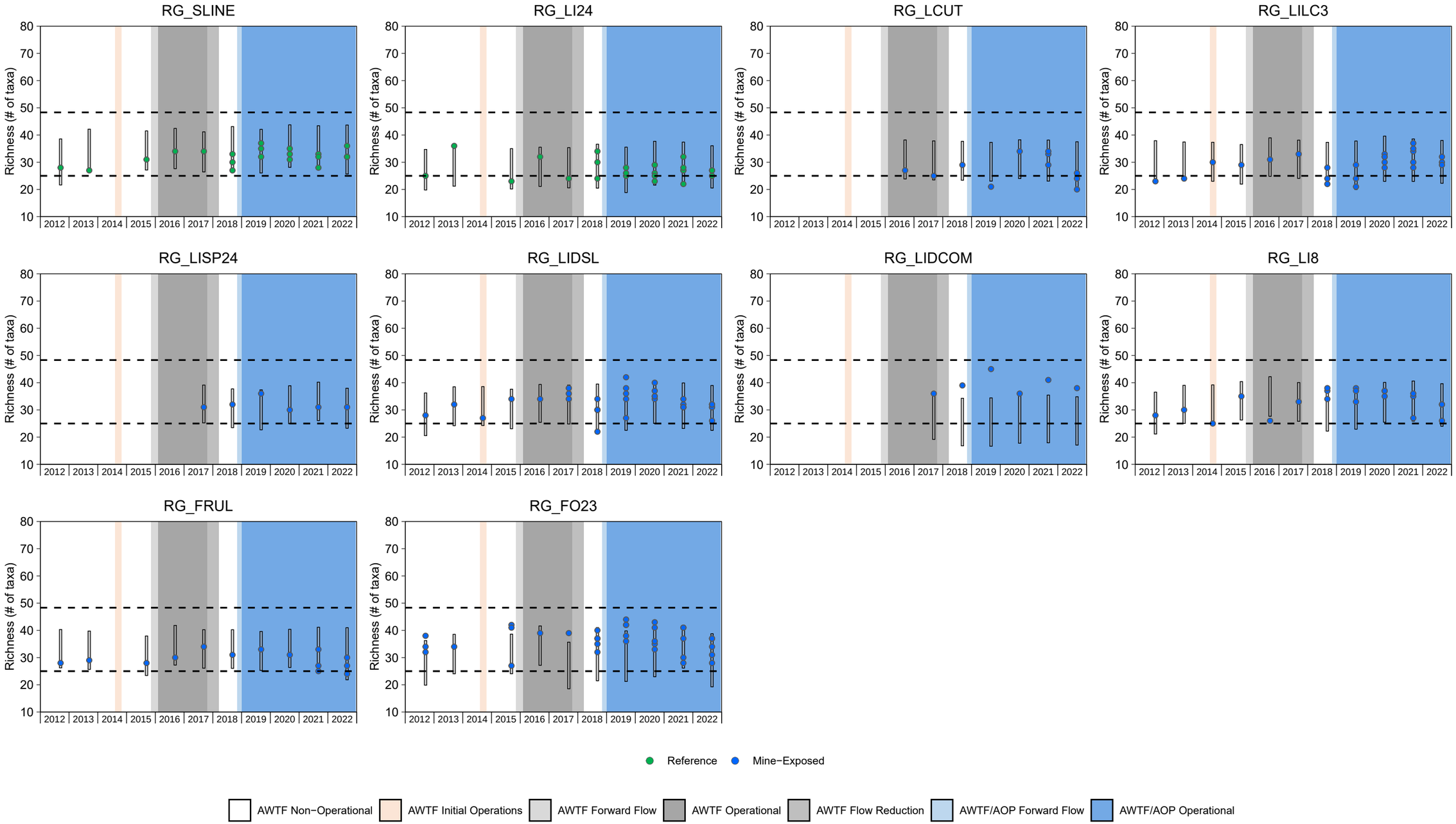


Figure C.6: Benthic Invertebrate Community Richness (Lowest Practical Level; 3−minute Kick and Sweep Sampling) from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown with grey shaded, black outlined rectangles (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

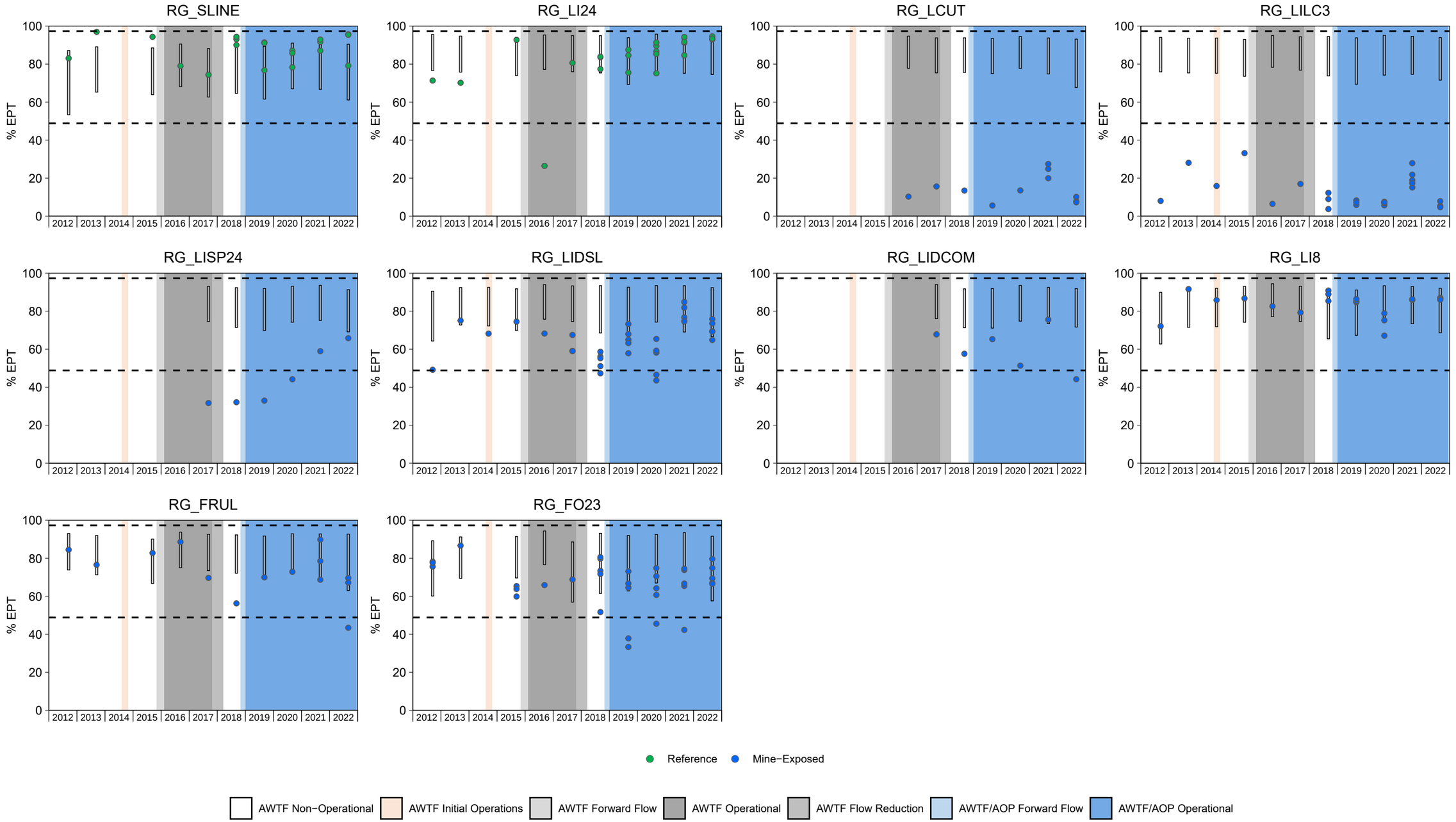


Figure C.7: Benthic Invertebrate Community Relative Ephemeroptera, Plecoptera, and Trichoptera Abundance (%EPT; 3−Minute Kick and Sweep Sampling) from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown with grey shaded, black outlined rectangles (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

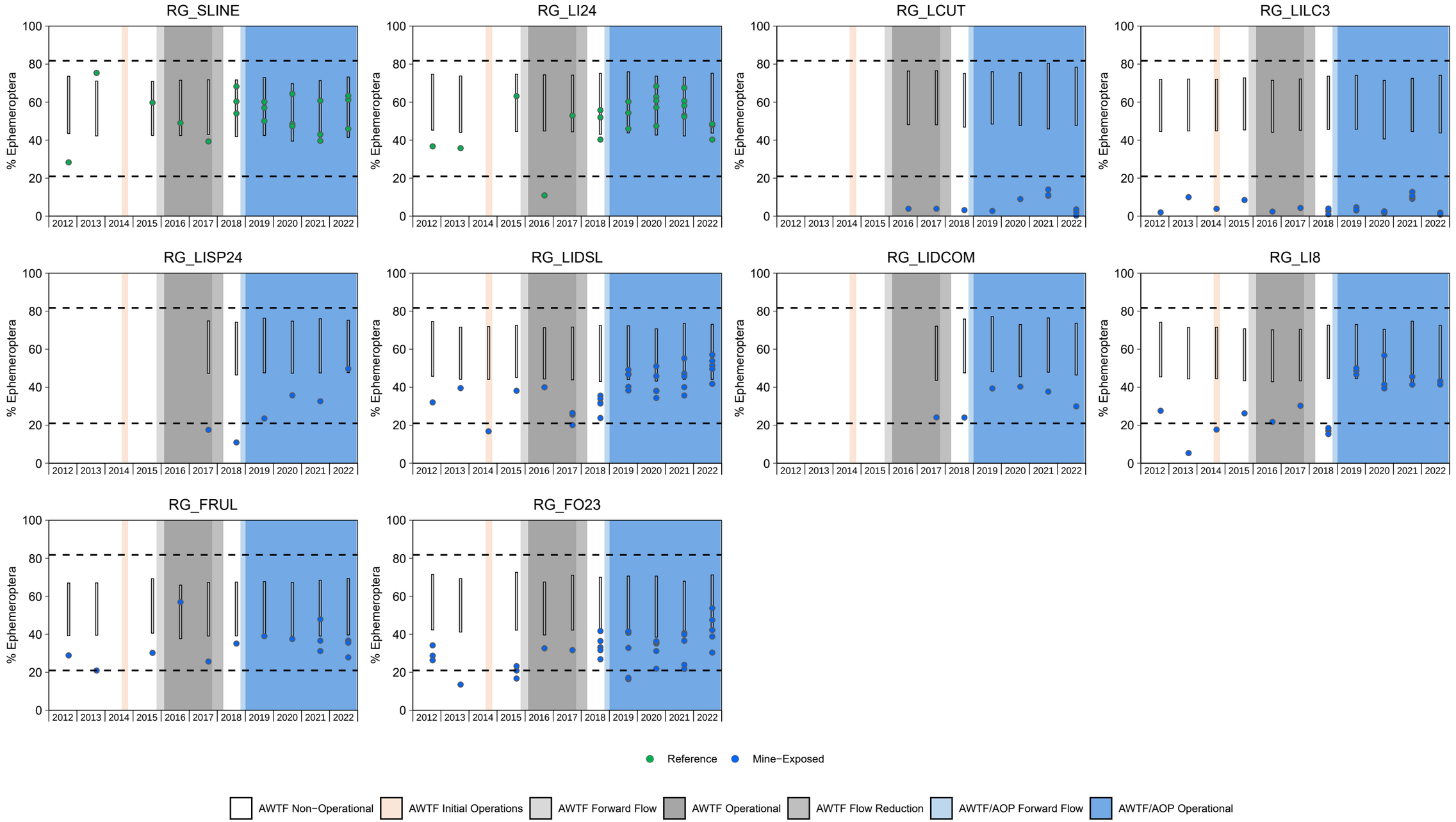


Figure C.8: Benthic Invertebrate Community Relative Ephemeroptera Abundance (%Ephemeroptera; 3−Minute Kick and Sweep Sampling) from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown with grey shaded, black outlined rectangles (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

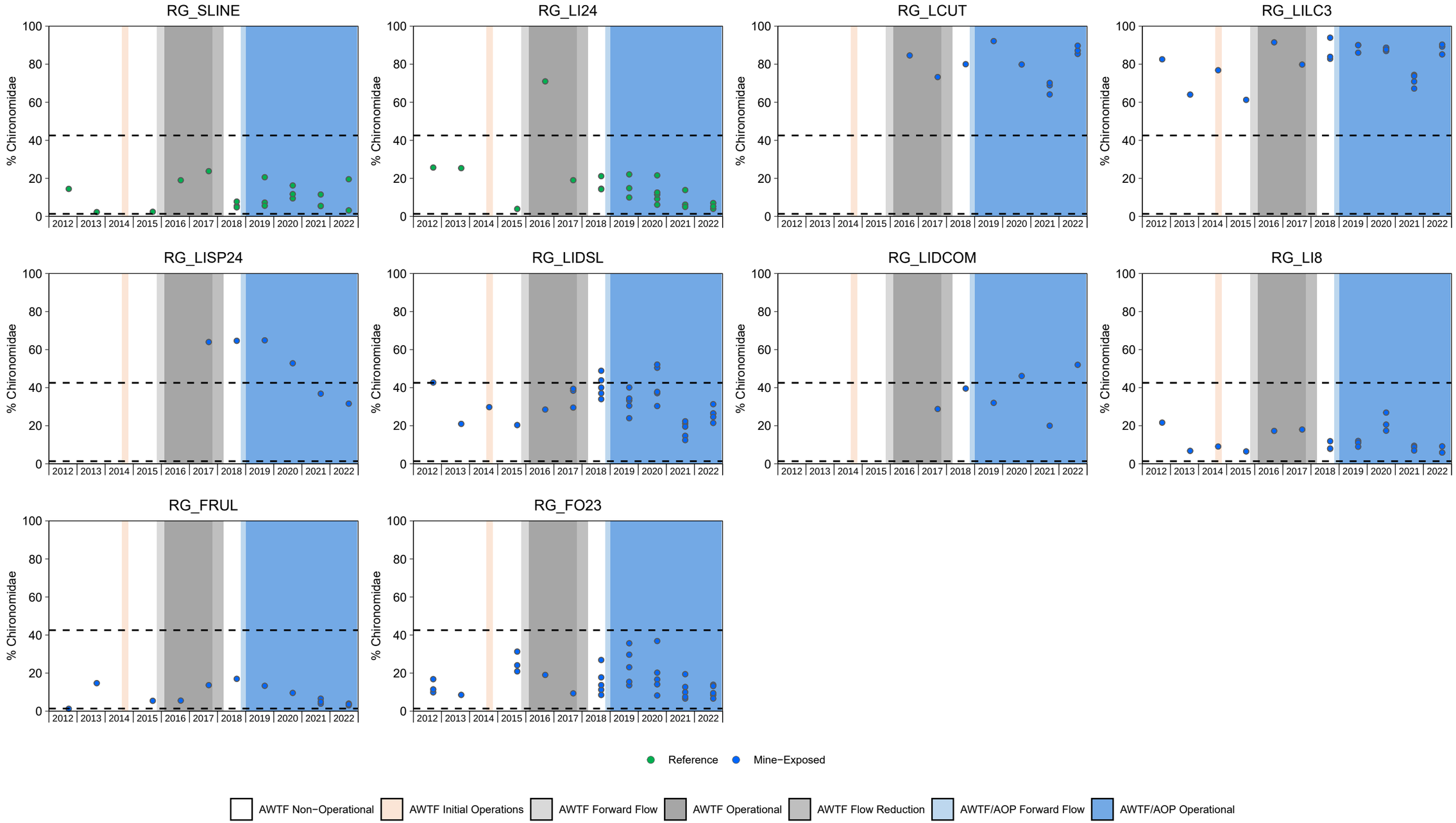


Figure C.9: Benthic Invertebrate Chironomidae Abundance (%Chironomidae; 3−Minute Kick and Sweep Sampling) Endpoints from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

Table C.1: Visual Periphyton Coverage Scores from Line Creek and Fording River, September 2022

Area Type	Biological Area	Station					Mean	Standard Deviation
		1	2	3	4	5		
Reference	RG_LI24	2	2	2	2	2	2.0	0.0
	RG_SLINE	2	2	2	2	2	2.0	0.0
Mine-Exposed	RG_LCUT	3	3	3	2	3	2.8	0.4
	RG_LILC3	3	3	3	3	4	3.2	0.4
	RG_LISP24	2	2	3	3	3	2.6	0.5
	RG_LIDSL	2	2	3	2	2	2.2	0.4
	RG_LIDCOM	3	3	3	3	3	3.0	0.0
	RG_LI8	3	2	2	2	2	2.2	0.4
	RG_FRUL	1	1	2	1	1	1.2	0.4
	RG_FO23	2	2	2	2	2	2.0	0.0

Notes: Periphyton Coverage Scores (Environment Canada, 2012b):
1 = Rocks not slippery, no obvious colour (<0.5mm thick)
2 = Rocks slightly slippery, yellow-brown to light green colour (0.5-1mm thick)
3 = Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5mm thick)
4 = Rocks are very slippery, numerous clumps (5-20mm thick)
5 = Rocks mostly obscured by algae mat, may have long strands (>20mm thick)

Table C.2: Statistical Comparisons of Total Benthic Invertebrate Biomass (Hess Samples) Over Time and Relative to Reference (RG_SLINE and RG_LI24) for RG_LIDSL and RG_LILC3, 2014 to 2022

Area	Comparison	Term	DF	F-Statistic	P-value	Comparisons Among Years								
						2014	2015	2016	2017	2018	2019	2020	2021	2022
RG_LILC3	RG_LILC3 over time					A	A	A	A	A	A	A	A	A
	RG_LILC3 vs RG_SLINE and RG_LI24 over time	Year	8	3.70	<0.001									
		CI	1	1,024	<0.001									
		Area(CI)	1	17.8	<0.001									
		CI×Year	8	0.797	0.606	A	A	A	A	A	A	A	A	A
		Area(CI)×Year	7	1.40	0.210									
		Error	172	-	-									
RG_LIDSL	RG_LIDSL over time					A	A	A	A	A	A	A	A	A
	RG_LIDSL vs RG_SLINE and RG_LI24 over time	Year	8	2.27	0.025									
		CI	1	240	<0.001									
		Area(CI)	1	17.7	<0.001									
		CI×Year	8	2.70	0.008	A	AB	AB	AB	AB	B	AB	AB	B
		Area(CI)×Year	7	1.39	0.214									
		Error	172	-	-									

Relevant p-value < 0.1.

Notes: "-" no data. Years that share a letter (e.g., A,B) are not significantly different (p-value=0.1). Letters assigned such that the year with the highest mean value (for the Year term) or highest difference between mine-exposed and reference (for the Area×Year term) is assigned the letter A. The p-value used to determine differences were adjusted using Tukey's honestly significant differences method. One outlier removed in 2017 and 2018.

Table C.3: Summary Metrics for Benthic Invertebrate Endpoints Collected by Hess Sampler at Line Creek, September 2022

Area	Biological Area Code	Sample Code	Total Density (org/m^2)[a]	Biomass (g/m^2 ww)[a]	EPT Density (org/m^2)	Ephemeroptera Density (org/m^2)	Chironomidae Density (org/m^2)
Reference	RG_LI24	RG_LI24_HESS-1	2,090	4.2	1,960	1,400	50
		RG_LI24_HESS-2	3,580	6.6	3,210	2,040	100
		RG_LI24_HESS-3	3,410	8.9	2,730	1,730	310
		RG_LI24_HESS-4	3,670	7.5	3,100	1,780	370
		RG_LI24_HESS-5	2,470	8.3	2,280	1,270	110
	RG_SLINE	RG_SLINE_HESS-1	4,740	14	3,910	2,090	370
		RG_SLINE_HESS-2	2,000	8.9	1,330	680	310
		RG_SLINE_HESS-3	7,680	19	4,760	2,540	2,480
		RG_SLINE_HESS-4	3,200	6.4	2,480	1,490	320
		RG_SLINE_HESS-5	2,260	6.2	1,900	1,320	200
Mine-exposed	RG_LILC3	RG_LILC3_HESS-1	56,750	103	1,790	560	46,560
		RG_LILC3_HESS-2	43,520	50	1,440	880	35,040
		RG_LILC3_HESS-3	83,840	177	3,760	1,040	59,120
		RG_LILC3_HESS-4	30,440	66	1,310	400	23,040
		RG_LILC3_HESS-5	33,610	76	1,290	400	22,480
		RG_LILC3_HESS-6	39,520	42	400	160	29,520
		RG_LILC3_HESS-7	30,890	90	1,290	320	25,520
		RG_LILC3_HESS-8	39,120	62	1,760	320	28,400
		RG_LILC3_HESS-9	11,090	18	490	120	9,000
		RG_LILC3_HESS-10	47,690	65	1,130	160	38,320
	RG_LIDSL	RG_LIDSL_HESS-1	8,010	15	3,510	2,440	3,300
		RG_LIDSL_HESS-2	8,680	13	2,870	2,110	4,690
		RG_LIDSL_HESS-3	12,000	15	4,400	3,230	4,660
		RG_LIDSL_HESS-4	11,960	24	5,020	3,780	4,710
		RG_LIDSL_HESS-5	9,770	33	6,910	5,680	1,640
		RG_LIDSL_HESS-6	7,730	19	5,050	4,210	1,820
		RG_LIDSL_HESS-7	4,830	5.5	2,700	1,400	660
		RG_LIDSL_HESS-8	6,310	7.7	3,360	2,330	680
		RG_LIDSL_HESS-9	5,180	16	3,560	2,560	1,020
		RG_LIDSL_HESS-10	6,430	15	4,860	3,820	670

Notes: org = organism; ww = wet weight; EPT = Ephemeroptera, Plecoptera, Trichoptera

[a] Total density and biomass are reported for all organisms in the sample.

Table C.4: Statistical Comparisons of Total Benthic Invertebrate Density (Hess Samples) Over Time and Relative to Reference (RG_SLINE and RG_LI24) for RG_LIDSL and RG_LILC3, 2014 to 2022

Area	Comparison	Term	DF	F-Statistic	P-value	Comparisons Among Years								
						2014	2015	2016	2017	2018	2019	2020	2021	2022
RG_LILC3	RG_LILC3 over time					A	A	A	A	A	A	A	A	A
	RG_LILC3 vs RG_SLINE and RG_LI24 over time	Year	8	6.10	<0.001									
		CI	1	1,457	<0.001									
		Area(CI)	1	9.71	0.002									
		CI×Year	8	2.91	0.005									
		Area(CI)×Year	7	4.56	<0.001	CI×Year effect depends on Area								
		Error	172	-	-									
	RG_LILC3 vs RG_SLINE over time	Area	1	860	<0.001									
		Year	8	4.95	<0.001									
		Area×Year	8	3.14	0.003	A	B	AB	AB	B	B	AB	AB	AB
		Error	130	-	-									
	RG_LILC3 vs RG_LI24 over time	Area	1	978	<0.001									
		Year	8	3.39	0.002									
		Area×Year	7	3.33	0.003	ABC	ABC	-	ABC	AB	AC	B	C	ABC
		Error	123	-	-									
RG_LIDSL	RG_LIDSL over time					AB	AB	B	AB	A	AB	AB	AB	AB
	RG_LIDSL vs RG_SLINE and RG_LI24 over time	Year	8	7.18	<0.001									
		CI	1	343	<0.001									
		Area(CI)	1	11.9	<0.001									
		CI×Year	8	4.37	<0.001									
		Area(CI)×Year	7	5.59	<0.001	CI×Year effect depends on Area								
		Error	172	-	-									
	RG_LIDSL vs RG_SLINE over time	Area	1	179	<0.001									
		Year	8	6.53	<0.001									
		Area×Year	8	4.38	<0.001	A	B	BC	AC	BC	B	B	BC	BC
		Error	130	-	-									
	RG_LIDSL vs RG_LI24 over time	Area	1	303	<0.001									
		Year	8	4.40	<0.001									
		Area×Year	7	5.15	<0.001	A	A	-	A	A	AB	A	B	AB
		Error	123	-	-									

Relevant p-value < 0.1.

Notes: "-' no data. Years that share a letter (e.g., A,B) are not significantly different (p-value=0.1). Letters assigned such that the year with the highest mean value (for the Year term) or highest difference between mine-exposed and reference (for the Area×Year term) is assigned the letter A. The p-value used to determine differences were adjusted using Tukey's honestly significant differences method. One outlier removed in 2017 and 2018.

Table C.5: Summary of Benthic Invertebrate Endpoints Collected by 3-Minute Kick and Sweep Sampling at Line Creek and Fording River, September 2022

Area	Biological Area Code	Sample Code	Abundance (# org/ 3-min kick)	LPL Richness (# of taxa)	Family Richness	EPT		Ephemeroptera		Chironomidae	
						Abundance (# org/ 3-min kick)	Relative Abundance (%)	Abundance (# org/ 3-min kick)	Relative Abundance (%)	Abundance (# org/ 3-min kick)	Relative Abundance (%)
Reference	RG_SLINE	RG_SLINE-01	1,755	36	20	1,680	96	1,075	61	55	3.1
		RG_SLINE-02	7,880	32	18	6,240	79	3,620	46	1,540	20
		RG_SLINE-03	2,493	32	19	2,379	95	1,579	63	79	3.2
	RG_LI24	RG_LI24-01	3,922	25	17	3,711	95	1,878	48	156	4.0
		RG_LI24-02	6,260	27	13	5,820	93	2,520	40	440	7.0
		RG_LI24-03	4,033	27	16	3,767	93	1,956	48	211	5.2
Mine-exposed	RG_LCUT	RG_LCUT-01	8,500	24	14	860	10	300	3.5	7,260	85
		RG_LCUT-02	9,020	26	13	700	7.8	180	2.0	7,860	87
		RG_LCUT-03	7,400	20	10	540	7.3	20	0.27	6,640	90
	RG_LILC3	RG_LILC3-01	22,500	30	16	1,200	5.3	400	1.8	20,080	89
		RG_LILC3-02	14,860	29	17	700	4.7	120	0.81	13,420	90
		RG_LILC3-03	11,580	32	15	910	7.9	180	1.6	9,860	85
	RG_LISP24	RG_LISP24-01	6,960	31	17	4,580	66	3,460	50	2,200	32
	RG_LIDSL	RG_LIDSL-01	11,200	31	18	7,780	70	5,760	51	2,960	26
		RG_LIDSL-02	7,020	31	16	4,860	69	3,780	54	1,860	26
		RG_LIDSL-03	5,517	32	16	4,183	76	3,150	57	1,183	22
		RG_LIDSL-04	5,483	26	15	4,033	74	2,717	50	1,350	25
		RG_LIDSL-05	7,280	32	18	4,720	65	3,040	42	2,280	31
	RG_LIDCOM	RG_LIDCOM-01	22,260	38	21	9,840	44	6,660	30	11,580	52
	RG_LI8	RG_LI8-01	8,940	32	17	7,780	87	3,720	42	820	9.2
		RG_LI8-02	3,380	26	17	2,930	87	1,460	43	200	5.9
		RG_LI8-03	8,160	32	18	7,020	86	3,380	41	480	5.9
	RG_FRUL	RG_FRUL-01	5,867	24	19	4,083	70	2,150	37	233	4.0
		RG_FRUL-02	4,112	30	20	2,762	67	1,462	36	125	3.0
		RG_FRUL-03	4,175	27	19	1,812	43	1,162	28	150	3.6
	RG_FO23	RG_FO23-01	6,340	37	24	4,400	69	2,460	39	880	14
		RG_FO23-02	2,355	34	22	1,875	80	1,265	54	200	8.5
		RG_FO23-03	4,671	37	24	3,129	67	1,971	42	443	9.5
		RG_FO23-04	3,180	28	20	2,380	75	1,510	48	210	6.6
		RG_FO23-05	6,520	31	21	4,340	67	1,980	30	860	13

Notes: LPL= Lowest Practical Level; EPT= Ephemeroptera, Plecoptera, and Trichoptera.

APPENDIX D
SELENIUM

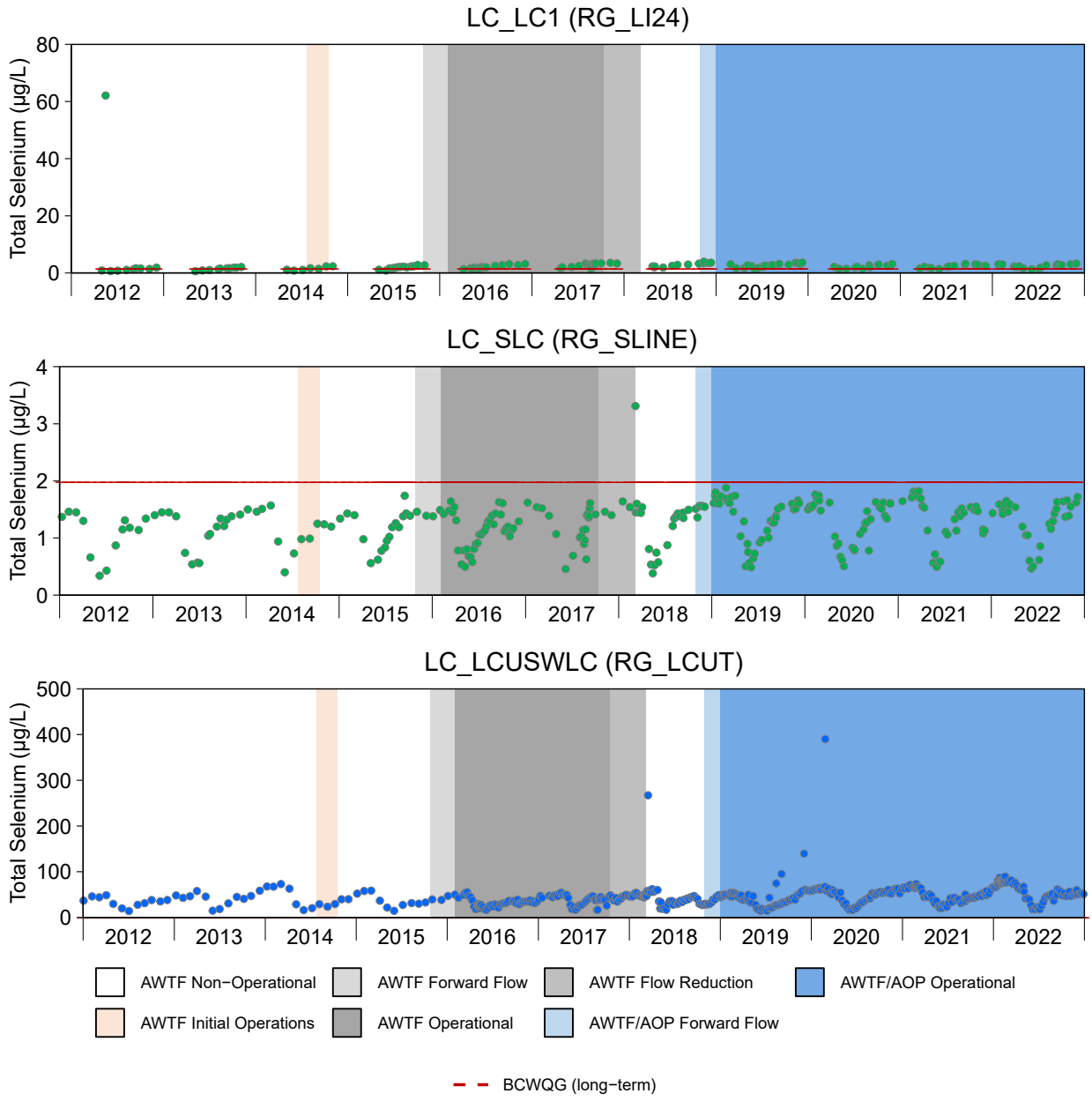
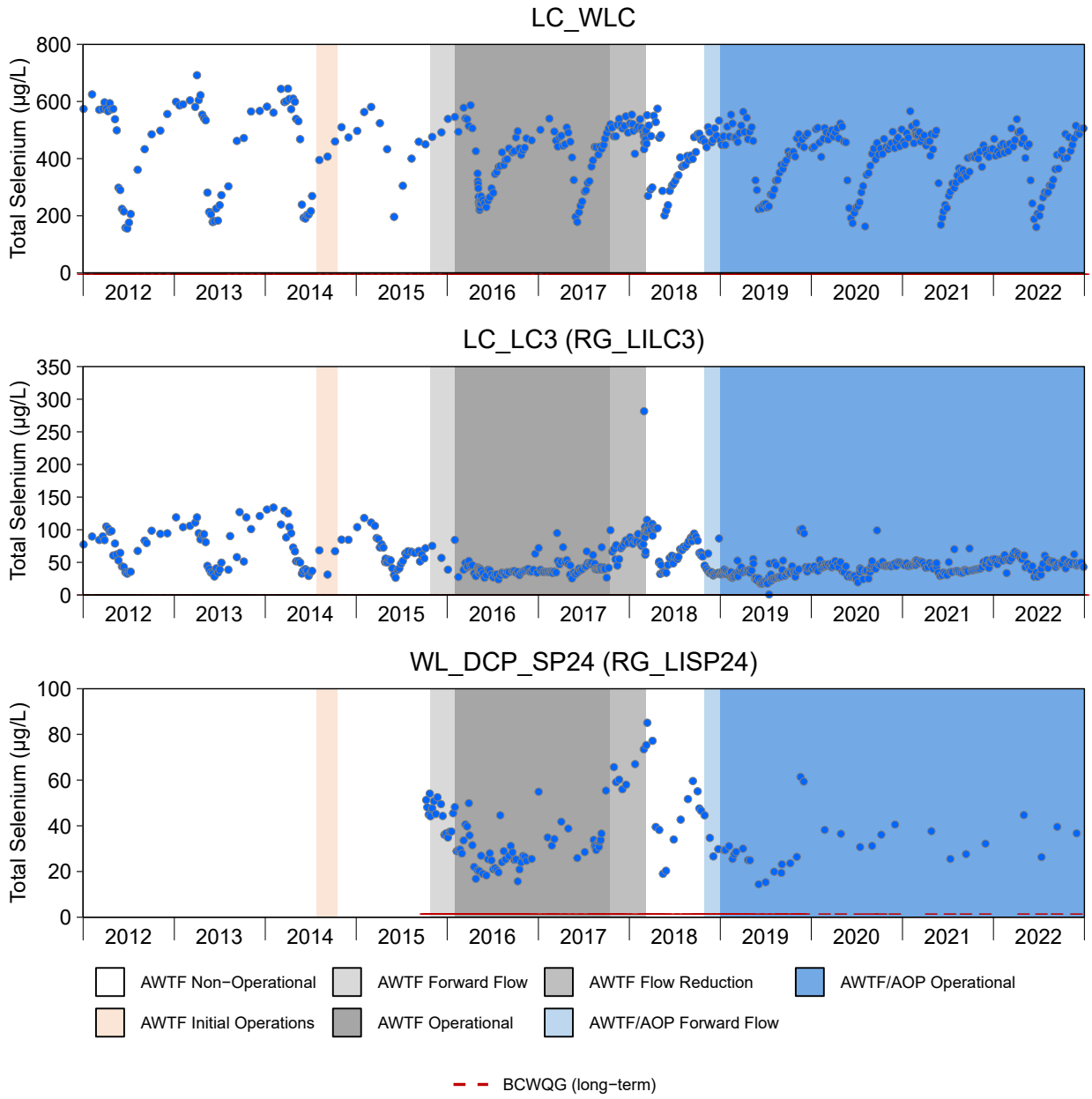


Figure D.1: Time Series Plots for Aqueous Total Selenium Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.



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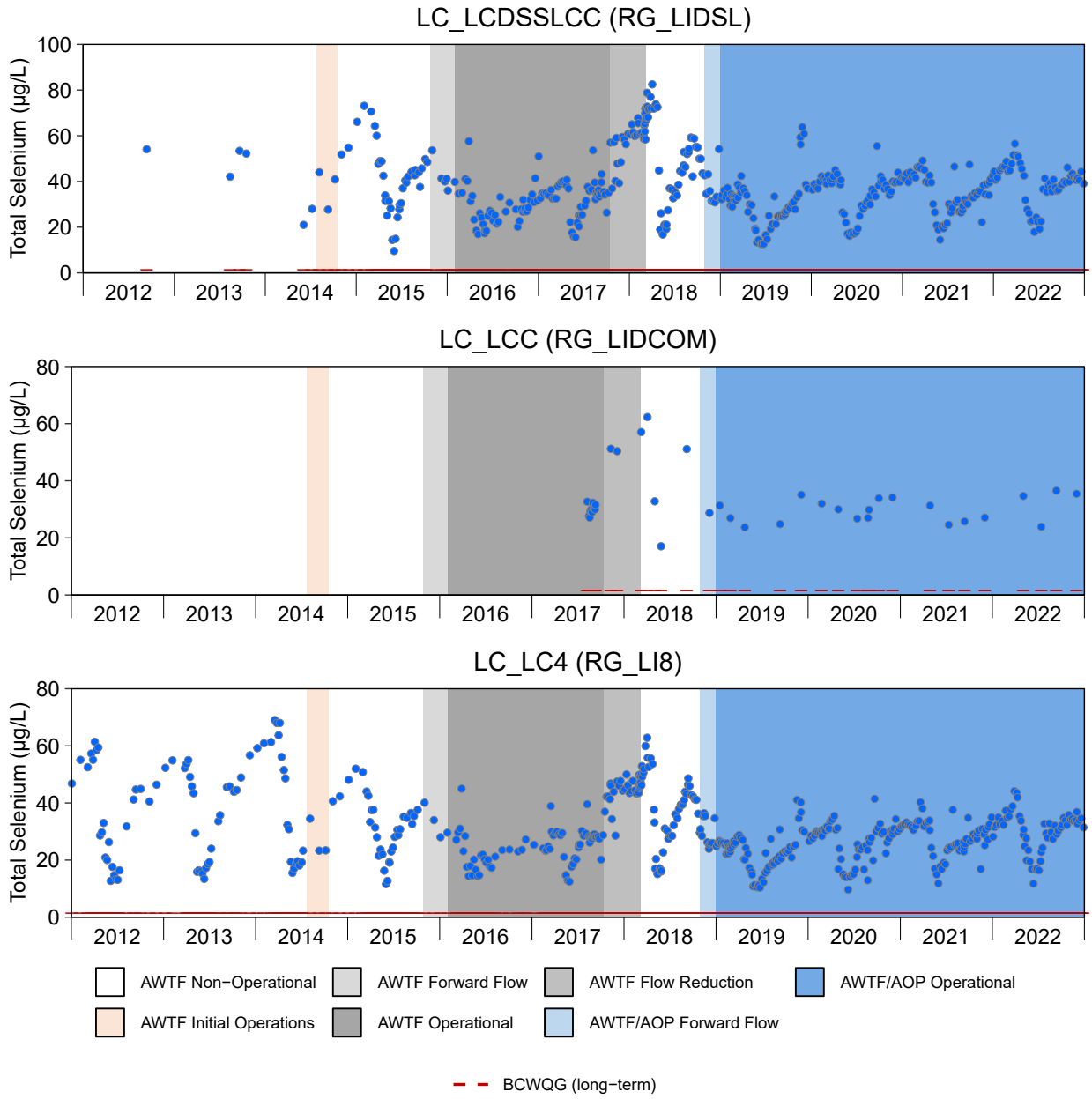

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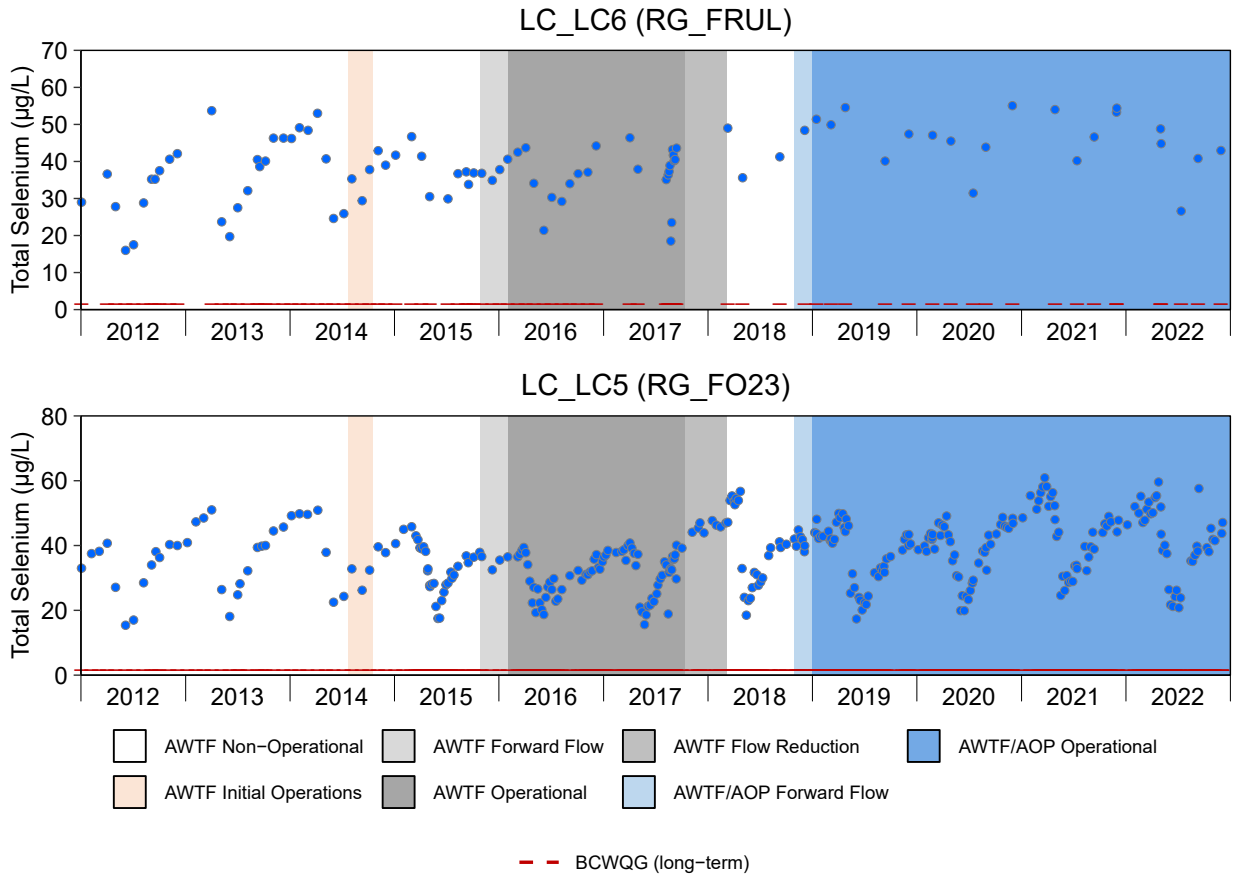
Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.



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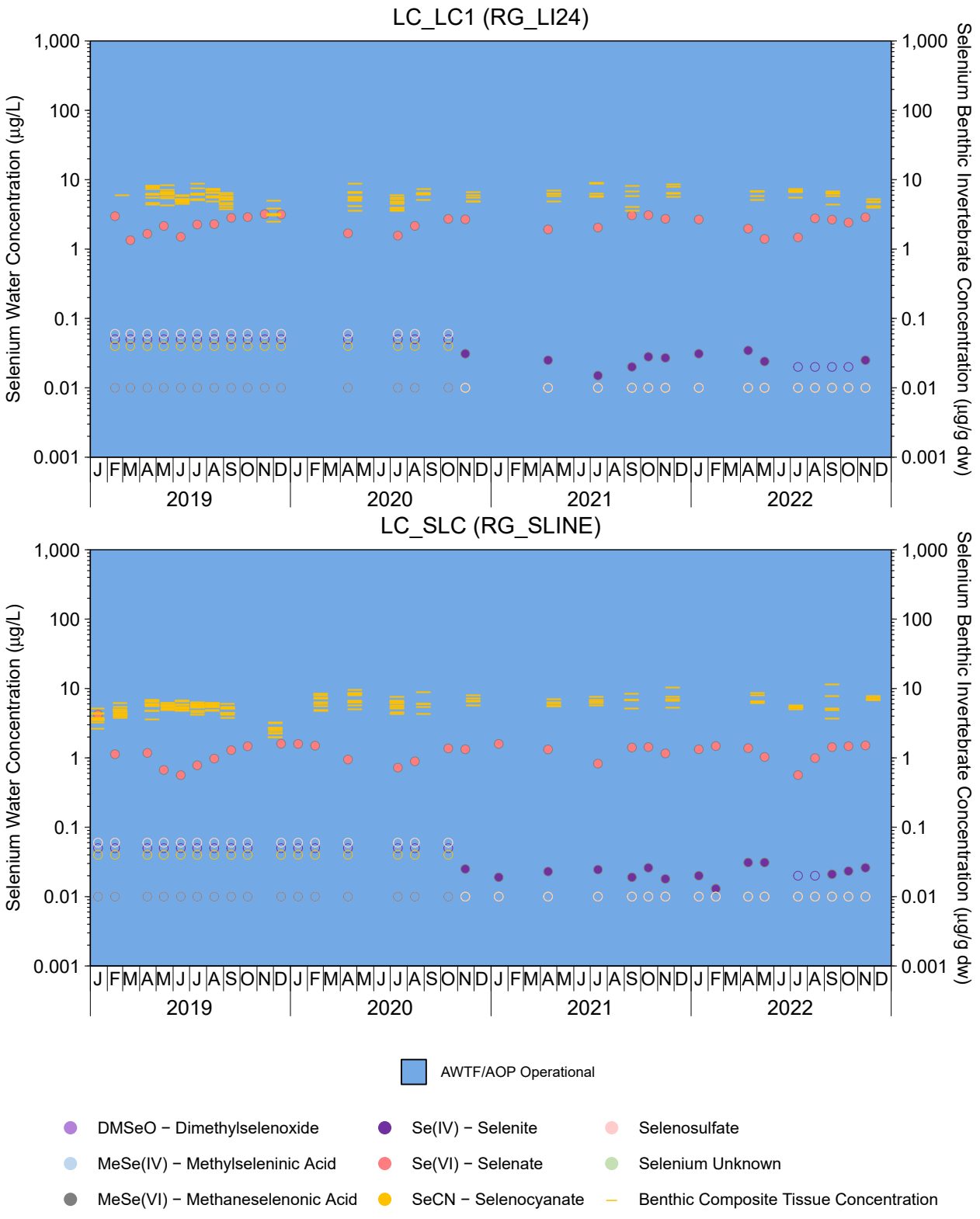


Figure D.2: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−exposed and Reference Stations in Line Creek, LCO LAEMP, 2019 to 2022

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. Selenium species with all values at the laboratory reporting limit are excluded from the plot.

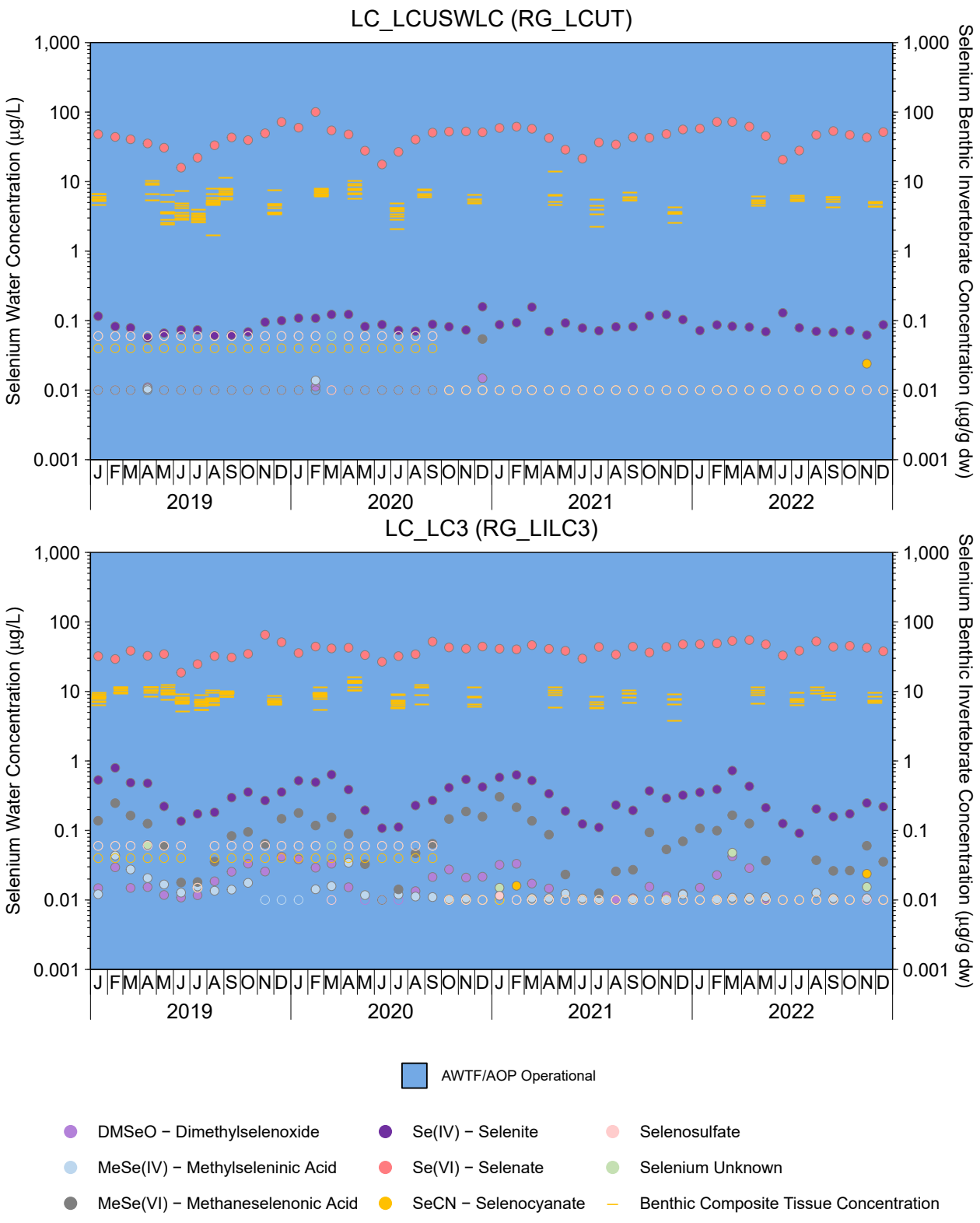


Figure D.2: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−exposed and Reference Stations in Line Creek, LCO LAEMP, 2019 to 2022

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. Selenium species with all values at the laboratory reporting limit are excluded from the plot.

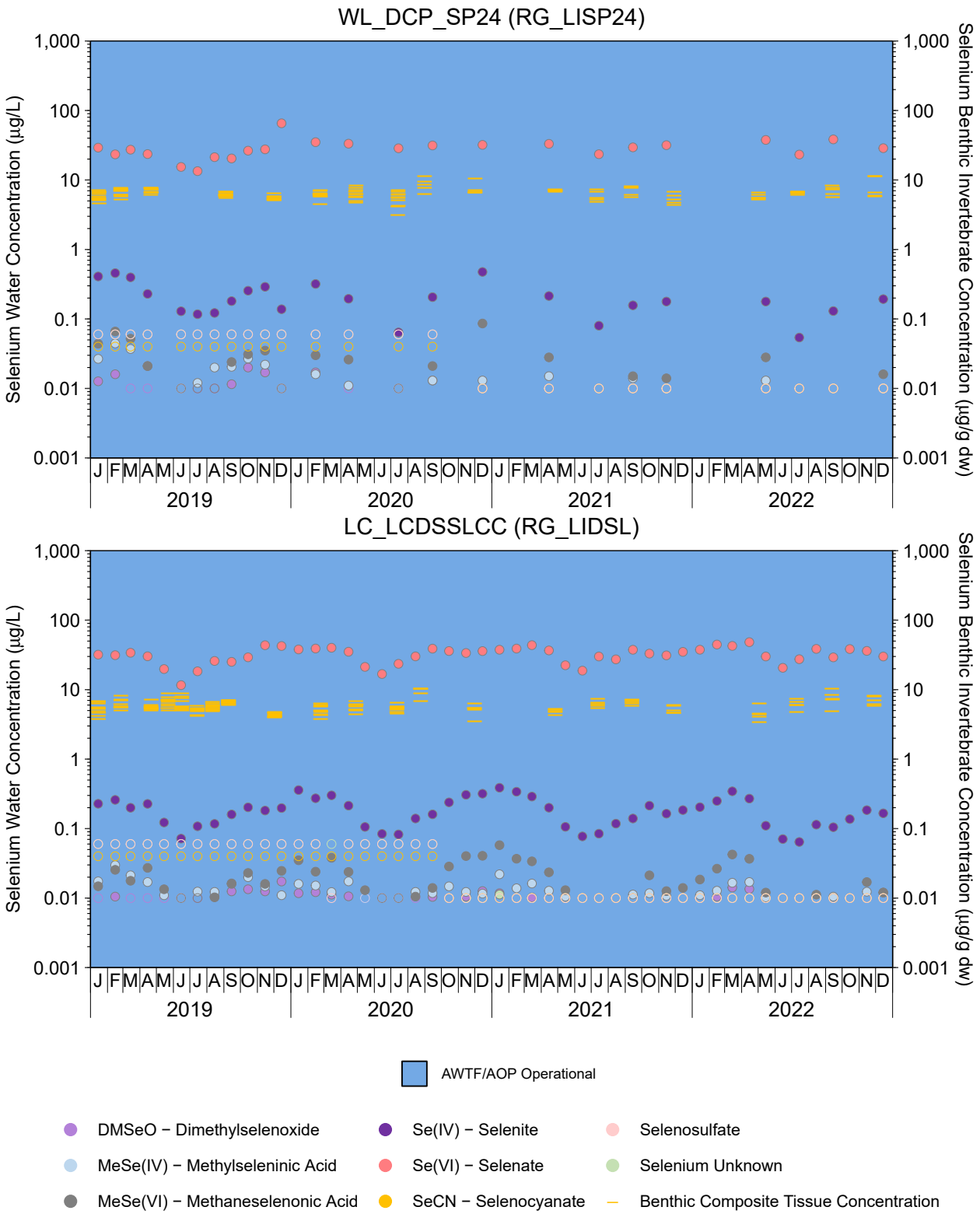


Figure D.2: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−exposed and Reference Stations in Line Creek, LCO LAEMP, 2019 to 2022

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. Selenium species with all values at the laboratory reporting limit are excluded from the plot.

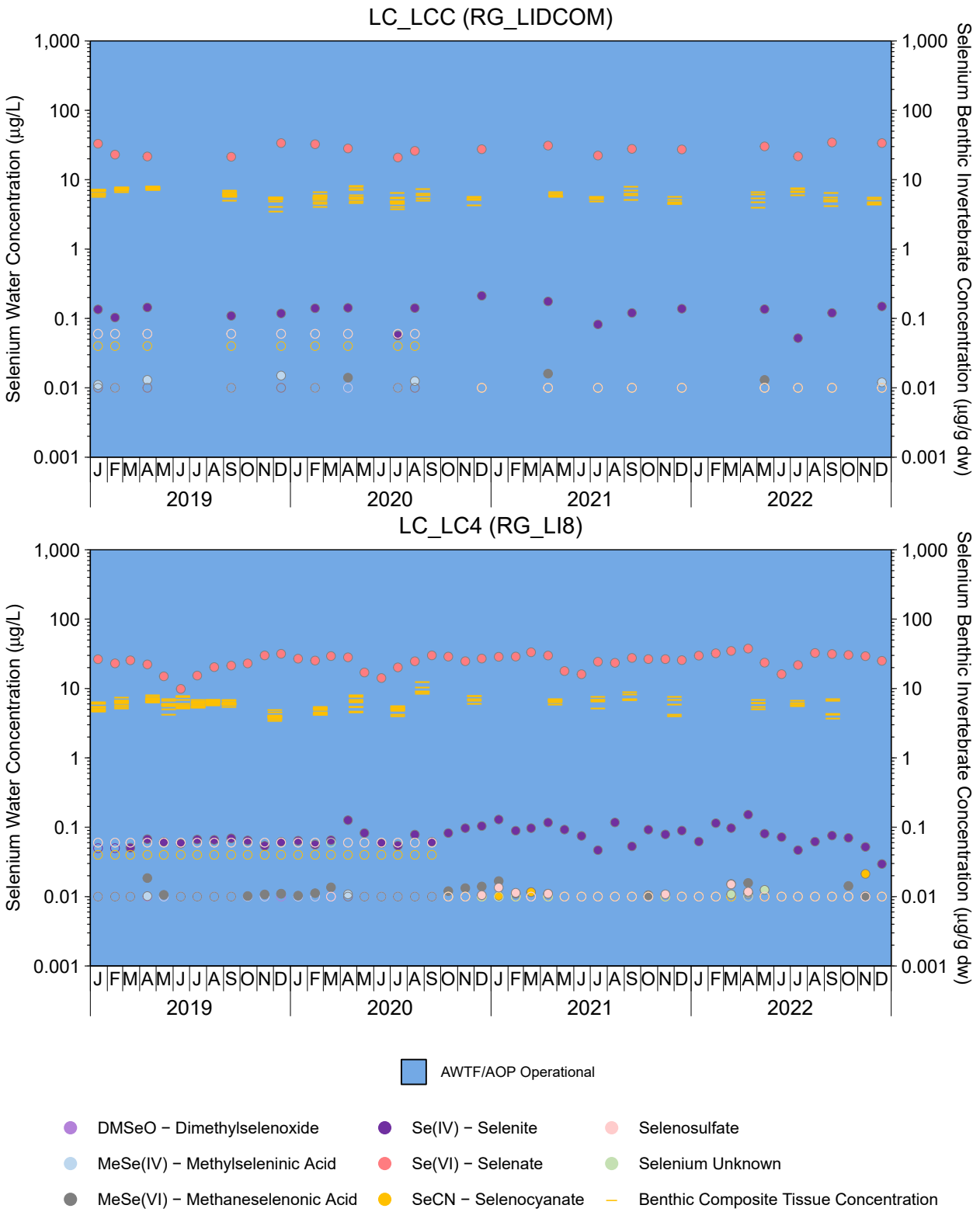


Figure D.2: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−exposed and Reference Stations in Line Creek, LCO LAEMP, 2019 to 2022

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. Selenium species with all values at the laboratory reporting limit are excluded from the plot.

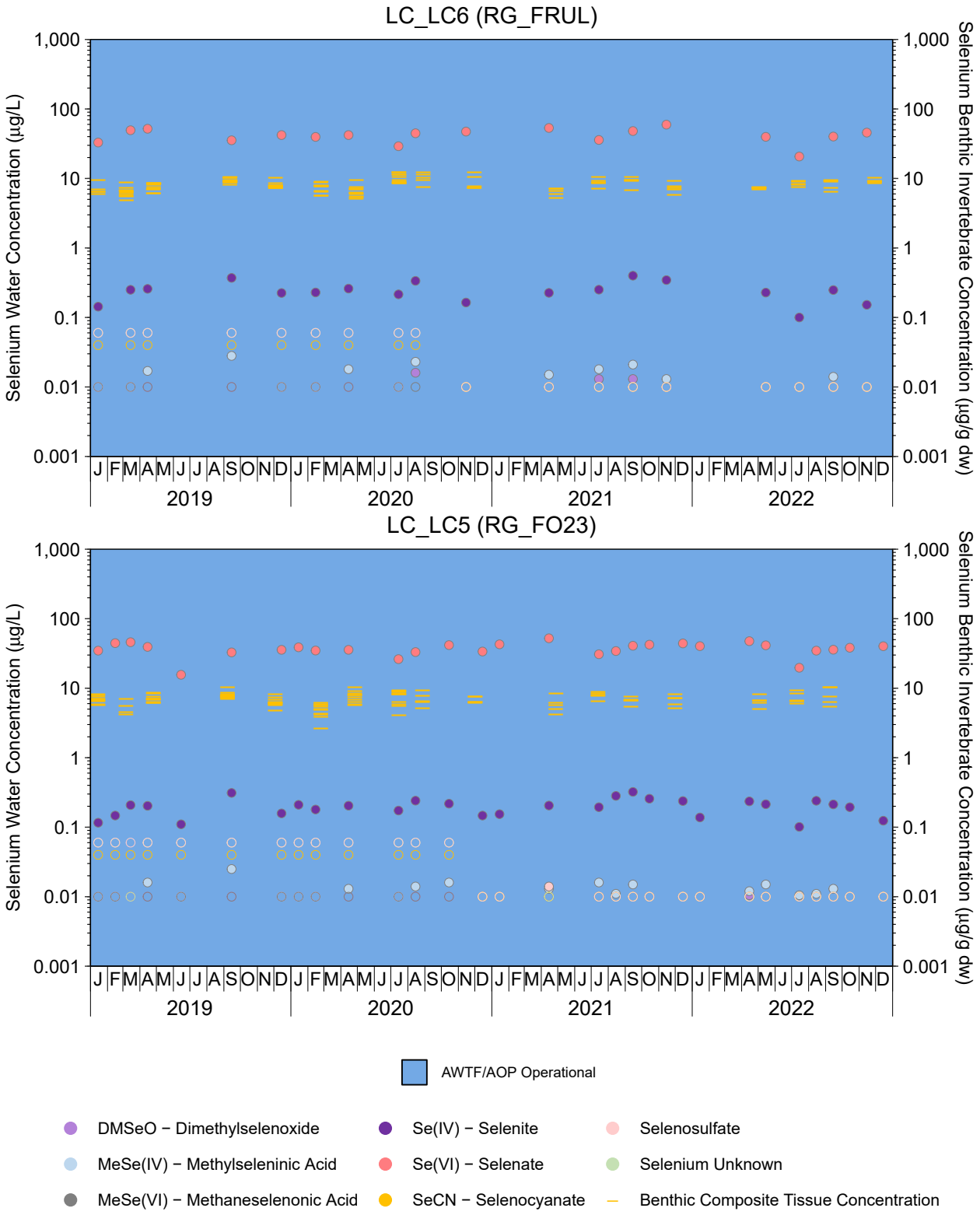


Figure D.2: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−exposed and Reference Stations in Line Creek, LCO LAEMP, 2019 to 2022

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. Selenium species with all values at the laboratory reporting limit are excluded from the plot.

Table D.1: Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples Collected from Line Creek and Fording River, Line Creek LAEMP, 2022

Waterbody		Biological Area Code	Sample Code	Sample Date	Dominant Taxa	Selenium Concentration (mg/kg dw)					
						Sample	Area Median	Area Minimum	Area Maximum	Area Mean	Area Standard Deviation
Line Creek	Reference	RG_LI24	RG_LI24_INV-1	2-May-22	Ephem, Plec, Trich	5.4	7.1	5.4	7.2	6.6	0.8
			RG_LI24_INV-2	2-May-22	Ephem, Plec, Trich	7.2					
			RG_LI24_INV-3	2-May-22	Ephem, Plec	7.1					
			RG_LI24_INV-4	2-May-22	Ephem, Plec	6.1					
			RG_LI24_INV-5	2-May-22	Plec, Ephem	7.2					
			RG_LI24_INV-1	11-Jul-22	Ephem, Plec, Trich	7.1	7.1	5.8	7.8	7.0	0.7
			RG_LI24_INV-2	11-Jul-22	Ephem, Plec, Trich	5.8					
			RG_LI24_INV-3	11-Jul-22	Ephem, Plec, Rhyac	7.8					
			RG_LI24_INV-4	11-Jul-22	Ephem, Plec, Chiron	7.0					
			RG_LI24_INV-5	11-Jul-22	Ephem, Plec, Rhyac	7.3					
			RG_LI24_INV-1	17-Sep-22	Plec, Ephem, Trich	6.8	6.6	4.7	7.2	6.3	1.0
			RG_LI24_INV-2	17-Sep-22	Ephem, Plec, Rhyac	6.2					
			RG_LI24_INV-3	17-Sep-22	Plec, Hydro, Ephem, Rhyac	7.2					
			RG_LI24_INV-4	17-Sep-22	Ephem, Plec, Hydro	6.6					
			RG_LI24_INV-5	17-Sep-22	Plec, Ephem, Hydro, Chiron	4.7					
			RG_LI24_INV-1	30-Nov-22	Ephem, Plec	5.2	5.0	4.2	5.5	4.9	0.5
			RG_LI24_INV-2	30-Nov-22	Plec, Ephem, Rhyac	5.0					
			RG_LI24_INV-3	30-Nov-22	Plec, Ephem, Para	4.4					
			RG_LI24_INV-4	30-Nov-22	Plec, Ephem, Rhyac	5.5					
			RG_LI24_INV-5	30-Nov-22	Plec, Ephem	4.2					
		RG_SLINE	RG_SLINE_INV-1	3-May-22	Ephem, Plec	8.5	6.9	6.5	9.1	7.6	1.2
			RG_SLINE_INV-2	3-May-22	Plec, Ephem	6.9					
			RG_SLINE_INV-3	3-May-22	Ephem, Plec	9.1					
			RG_SLINE_INV-4	3-May-22	Ephem, Plec, Para	6.5					
			RG_SLINE_INV-5	3-May-22	Ephem, Plec, Rhyac	6.8					
			RG_SLINE_INV-1	12-Jul-22	Ephem, Plec, Rhyac	5.8	5.8	5.3	6.0	5.7	0.3
			RG_SLINE_INV-2	12-Jul-22	Ephem, Plec, Para	5.6					
			RG_SLINE_INV-3	12-Jul-22	Ephem, Plec, Rhyac	6.0					
			RG_SLINE_INV-4	12-Jul-22	Plec, Ephem, Para	5.3					
			RG_SLINE_INV-5	12-Jul-22	Ephem, Plec, Rhyac	5.8					
			RG_SLINE_INV-1	16-Sep-22	Ephem, Hydro, Plec	8.3	5.4	3.9	12.0	7.0	3.2
			RG_SLINE_INV-2	16-Sep-22	Plec, Rhyac, Hydro, Ephem	3.9					
			RG_SLINE_INV-3	16-Sep-22	Ephem, Rhyac, Hydro, Plec	5.4					
			RG_SLINE_INV-4	16-Sep-22	Plec, Ephem, Rhyac	12.0					
			RG_SLINE_INV-5	16-Sep-22	Plec, Ephem, Rhyac	5.2					
			RG_SLINE_INV-1	30-Nov-22	Ephem, Plec, Para	7.2	7.5	7.2	8.2	7.6	0.4
			RG_SLINE_INV-2	30-Nov-22	Ephem, Plec, Para	7.2					
			RG_SLINE_INV-3	30-Nov-22	Ephem, Plec, Para	8.2					
			RG_SLINE_INV-4	30-Nov-22	Ephem, Plec, Rhyac	7.9					
			RG_SLINE_INV-5	30-Nov-22	Plec, Ephem, Rhyac	7.5					
	Mine-exposed	RG_LCUT	RG_LCUT_INV-1	2-May-22	Para, Rhyac, Plec	5.2	5.5	4.8	6.6	5.6	0.7
			RG_LCUT_INV-2	2-May-22	Plec, Rhyac, Para	4.8					
			RG_LCUT_INV-3	2-May-22	Para, Plec, Rhyac	5.5					
			RG_LCUT_INV-4	2-May-22	Para, Plec, Rhyac	5.8					
			RG_LCUT_INV-5	2-May-22	Para, Plec, Rhyac	6.6					
			RG_LCUT_INV-1	12-Jul-22	Para, Plec, Chiron	5.6	5.9	5.6	6.7	6.1	0.4
			RG_LCUT_INV-2	12-Jul-22	Plec, Para, Chiron	6.4					
			RG_LCUT_INV-3	12-Jul-22	Plec, Rhyac, Chiron	5.9					
			RG_LCUT_INV-4	12-Jul-22	Chiron, Para, Plec	5.9					
			RG_LCUT_INV-5	12-Jul-22	Rhyac, Chiron, Plec	6.7					
			RG_LCUT_INV-1	15-Sep-22	Hydro, Plec	5.9	5.9	4.5	6.4	5.7	0.8
			RG_LCUT_INV-2	15-Sep-22	Hydro, Plec, Chiron	5.4					
			RG_LCUT_INV-3	15-Sep-22	Hydro, Chiron, Plec, Ephem	4.5					
			RG_LCUT_INV-4	15-Sep-22	Hydro, Plec, Chiron	6.4					
			RG_LCUT_INV-5	15-Sep-22	Hydro, Rhyac, Plec, Chiron	6.3					
			RG_LCUT_INV-1	1-Dec-22	Para, Chiron, Plec	5.2	5.2	4.7	5.4	5.1	0.3
			RG_LCUT_INV-2	1-Dec-22	Plec, Para, Rhyac	4.7					
			RG_LCUT_INV-3	1-Dec-22	Plec, Para, Chiron	5.4					
			RG_LCUT_INV-4	1-Dec-22	Para, Plec, Ephem	5.3					
			RG_LCUT_INV-5	1-Dec-22	Plec, Chiron, Para	4.7					
		RG_LILC3	RG_LILC3_INV-1	2-May-22	Para, Plec, Ephem	7.1	10.0	7.1	12.0	9.9	1.9
			RG_LILC3_INV-2	2-May-22	Plec, Rhyac, Para	11.0					
			RG_LILC3_INV-3	2-May-22	Para, Plec, Chiron	9.3					
			RG_LILC3_INV-4	2-May-22	Para, Plec, Ephem	12.0					
			RG_LILC3_INV-5	2-May-22	Plec, Para, Ephem	10.0					
			RG_LILC3_INV-1	12-Jul-22	Rhyac, Para, Chiron	10.0	7.9	6.6	10.0	8.0	1.3
			RG_LILC3_INV-2	12-Jul-22	Plec, Para, Rhyac	8.2					
			RG_LILC3_INV-3	12-Jul-22	Plec, Rhyac, Para	6.6					
			RG_LILC3_INV-4	12-Jul-22	Para, Plec, Rhyac	7.9					
			RG_LILC3_INV-5	12-Jul-22	Para, Plec, Rhyac	7.5					
			RG_LILC3_INV-1	8-Sep-22	Hydro, Chiron, Ephem	9.2	9.2	8.0	10.0	9.1	0.7
			RG_LILC3_INV-2	8-Sep-22	hydro, Chiron, Plec	8.0					
			RG_LILC3_INV-3	8-Sep-22	hydro, Plec, Chiron	10.0					
			RG_LILC3_INV-4	8-Sep-22	hydro, Chiron, Plec	9.0					
			RG_LILC3_INV-5	8-Sep-22	hydro, Chiron, Plec	9.2					
			RG_LILC3_INV-1	1-Dec-22	Para, Chiron, Plec	8.9	7.8	7.2	10.0	8.3	1.1
			RG_LILC3_INV-2	1-Dec-22	Para, Chiron, Plec	7.8					
			RG_LILC3_INV-3	1-Dec-22	Para, Chiron, Plec	7.7					
			RG_LILC3_INV-4	1-Dec-22	Chiron, Para, Plec	7.2					
			RG_LILC3_INV-5	1-Dec-22	Chiron, Para, Plec	10.0					
		RG_LISP24	RG_LISP24_INV-1	3-May-22	Para, Rhyac, Plec	5.5	5.9	5.5	7.0	6.1	0.6
			RG_LISP24_INV-2	3-May-22	Ephem, Para, Plec	6.5					
			RG_LISP24_INV-3	3-May-22	Para, Rhyac, Ephem	7.0					
			RG_LISP24_INV-4	3-May-22	Ephem, Para, Rhyac	5.8					
			RG_LISP24_INV-5	3-May-22	Para, Ephem, Rhyac	5.9					
			RG_LISP24_INV-1	13-Jul-22	Plec, Ephem, Trich	7.2	6.9	6.5	7.2	6.9	0.3
			RG_LISP24_INV-2	13-Jul-22	Plec, Ephem, Para	7.2					
			RG_LISP24_INV-3	13-Jul-22	Ephem, Plec, Para	6.8					
			RG_LISP24_INV-4	13-Jul-22	Plec, Ephem, Trich	6.5					
			RG_LISP24_INV-5	13-Jul-22	Ephem, Plec, Para	6.9					
			RG_LISP24_INV-1	15-Sep-22	Hydro, Rhyac, Plec	8.2	7.7	6.0	8.8	7.5	1.1
			RG_LISP24_INV-2	14-Sep-22	Hydro, Rhyac, Ephem, Plec	8.8					
			RG_LISP24_INV-3	15-Sep-22	Hydro, Plec, Ephem	6.7					
			RG_LISP24_INV-4	15-Sep-22	Hydro, Rhyac, Plec	7.7					
			RG_LISP24_INV-5	15-Sep-22	Plec, Hydro, Ephem	6.0					
			RG_LISP24_INV-1	1-Dec-22	Plec, Para, Rhyac	12.0	7.0	6.2	12.0	8.7	3.0
			RG_LISP24_INV-2	1-Dec-22	Plec, Rhyac, Para	7.0					
			RG_LISP24_INV-3	1-Dec-22	Para, Rhyac, Ephem	6.2					
			RG_LISP24_INV-4	1-Dec-22	Plec, Para, Ephem	6.3					
			RG_LISP24_INV-5	1-Dec-22	Rhyac, Para, Plec	12.0					

Notes: Abbreviation of taxa was used. Plec = Plecoptera (stonefly). Ephem = Ephemeroptera (mayfly). Trich = Trichoptera (caddisfly). Dipt = Diptera (true flies). Oligo = Oligo (worms). Chiron = Chironomidae (non-biting midge). Tipul = Tipulidae (crane fly). Rhyac = Rhyacophilidae. Para = Parapsyche. Nema = Nematoda. Hydro = Hydropsychidae. Oligo Only = annelids only samples (which is not included in the analysis of composite-taxa and were collected based on annelids at >5% of the total biomass sample [Golder 2021b]).

Table D.1: Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples Collected from Line Creek and Fording River, Line Creek LAEMP, 2022

Waterbody		Biological Area Code	Sample Code	Sample Date	Dominant Taxa	Selenium Concentration (mg/kg dw)					
						Sample	Area Median	Area Minimum	Area Maximum	Area Mean	Area Standard Deviation
Line Creek	Mine-exposed	RG_LIDSL	RG_LIDSL_INV-1	4-May-22	Para, Ephem, Plec	4.3	4.7	3.6	6.7	4.8	1.2
			RG_LIDSL_INV-2	4-May-22	Plec, Para, Ephem	4.7					
			RG_LIDSL_INV-3	4-May-22	Para, Ephem, Plec	4.8					
			RG_LIDSL_INV-4	4-May-22	Para, Ephem, Plec	3.6					
			RG_LIDSL_INV-5	4-May-22	Para, Ephem, Plec	6.7					
			RG_LIDSL_INV-1	11-Jul-22	Ephem, Para, Plec	6.4	6.4	5.1	7.9	6.6	1.0
			RG_LIDSL_INV-2	11-Jul-22	Ephem, Plec, Para	5.1					
			RG_LIDSL_INV-3	11-Jul-22	Ephem, Plec, Para	7.2					
			RG_LIDSL_INV-4	11-Jul-22	Ephem, Plec, Para	6.4					
			RG_LIDSL_INV-5	11-Jul-22	Ephem, Plec, Para	7.9					
			RG_LIDSL_INV-1	13-Sep-22	Rhyac, Ephem, Plec	11.0	7.8	5.2	11.0	8.1	2.1
			RG_LIDSL_INV-2	13-Sep-22	Hydro, Ephem, Rhyac, Plec	9.0					
			RG_LIDSL_INV-3	13-Sep-22	Hydro, Tipul, Ephem	5.2					
			RG_LIDSL_INV-4	14-Sep-22	Hydro, Plec, Ephem	7.6					
			RG_LIDSL_INV-5	14-Sep-22	Hydro, Ephem, Rhyac, Plec	7.8					
			RG_LIDSL_INV-1	29-Nov-22	Plec, Rhyac, Ephem	8.5	7.5	6.2	8.7	7.5	1.1
			RG_LIDSL_INV-2	29-Nov-22	Plec, Rhyac, Ephem	7.5					
			RG_LIDSL_INV-3	29-Nov-22	Plec, Para, Ephem	6.2					
			RG_LIDSL_INV-4	29-Nov-22	Plec, Ephem, Para	8.7					
			RG_LIDSL_INV-5	29-Nov-22	Para, Plec, Rhyac	6.6					
		RG_LIDCOM	RG_LIDCOM_INV-1	3-May-22	Para, Ephem, Rhyac	4.2	5.7	4.2	7.0	5.7	1.1
			RG_LIDCOM_INV-2	3-May-22	Para, Ephem, Rhyac	5.0					
			RG_LIDCOM_INV-3	3-May-22	Para, Rhyac, Ephem	7.0					
			RG_LIDCOM_INV-4	3-May-22	Para, Ephem, Plec	6.5					
			RG_LIDCOM_INV-5	3-May-22	Ephem, Para, Plec	5.7					
			RG_LIDCOM_INV-1	14-Jul-22	Ephem, Plec, Para	7.0	7.1	6.4	8.0	7.3	0.6
			RG_LIDCOM_INV-2	14-Jul-22	Ephem, Para, Plec	8.0					
			RG_LIDCOM_INV-3	14-Jul-22	Ephem, Para, Plec	7.8					
			RG_LIDCOM_INV-4	14-Jul-22	Ephem, Plec, Para	6.4					
			RG_LIDCOM_INV-5	14-Jul-22	Ephem, Trich, Rhyac	7.1					
			RG_LIDCOM_INV-1	12-Sep-22	Hydro, Plec, Ephem	5.8	5.4	4.4	6.8	5.5	0.9
			RG_LIDCOM_INV-2	12-Sep-22	Hydro, Plec, Ephem	5.4					
			RG_LIDCOM_INV-3	12-Sep-22	Hydro, Rhyac, Plec, Ephem	5.2					
			RG_LIDCOM_INV-4	13-Sep-22	Hydro, Plec, Ephem	4.4					
			RG_LIDCOM_INV-5	13-Sep-22	Hydro, Plec, Ephem, Rhyac	6.8					
			RG_LIDCOM_INV-1	1-Dec-22	Plec, Para, Rhyac	4.6	5.0	4.6	5.8	5.1	0.5
			RG_LIDCOM_INV-2	1-Dec-22	Para, Rhyac, Plec	5.8					
			RG_LIDCOM_INV-3	1-Dec-22	Para, Plec, Rhyac	5.0					
			RG_LIDCOM_INV-4	1-Dec-22	Para, Plec, Rhyac	4.8					
			RG_LIDCOM_INV-5	1-Dec-22	Plec, Ephem, Para	5.5					
		RG_LI8	RG_LI8_INV-1	4-May-22	Plec, Rhyac, Ephem	6.5	6.5	5.4	7.3	6.3	0.7
			RG_LI8_INV-2	4-May-22	Ephem, Para, Rhyac	5.4					
			RG_LI8_INV-3	4-May-22	Ephem, Para, Rhyac	6.5					
			RG_LI8_INV-4	4-May-22	Plec, Rhyac, Ephem	5.8					
			RG_LI8_INV-5	4-May-22	Para, Rhyac, Ephem	7.3					
			RG_LI8_INV-1	14-Jul-22	Ephem, Trich, Plec	6.0	6.4	5.9	7.0	6.4	0.4
			RG_LI8_INV-2	14-Jul-22	Ephem, Plec, Trich	7.0					
			RG_LI8_INV-3	14-Jul-22	Ephem, Trich, Plec	6.4					
			RG_LI8_INV-4	14-Jul-22	Ephem, Trich, Para	5.9					
			RG_LI8_INV-5	14-Jul-22	Ephem, Trich, Plec	6.6					
			RG_LI8_INV-1	17-Sep-22	hydropsy, Plec, Ephem, Rhyac	3.9	4.6	3.9	7.5	5.5	1.6
			RG_LI8_INV-2	17-Sep-22	hydropsy, Plec, Rhyac, Ephem	4.4					
			RG_LI8_INV-3	17-Sep-22	Hydro, Plec, Ephem, Rhyac	7.5					
			RG_LI8_INV-4	17-Sep-22	hydropsy, Plec, Rhyac, Ephem, Tipul	7.0					
			RG_LI8_INV-5	17-Sep-22	Hydro, Plec, Rhyac, Ephem, Trich	4.6					
Fording River	Mine-exposed	RG_FRUL	RG_FRUL_INV-1	2-May-22	Plec, Ephem, Dipt	7.8	7.8	7.4	7.9	7.7	0.2
			RG_FRUL_INV-2	2-May-22	Plec, Ephem, Para	7.4					
			RG_FRUL_INV-3	2-May-22	Plec, Ephem, Dipt	7.7					
			RG_FRUL_INV-4	2-May-22	Plec, Ephem, Dipt	7.8					
			RG_FRUL_INV-5	2-May-22	Plec, Ephem, Rhyac	7.9					
			RG_FRUL_INV-1	13-Jul-22	Plec, Ephem, Rhyac	8.5	8.9	7.9	9.7	8.9	0.8
			RG_FRUL_INV-2	13-Jul-22	Plec, Ephem, Rhyac	9.6					
			RG_FRUL_INV-3	13-Jul-22	Ephem, Plec, Dipt	8.9					
			RG_FRUL_INV-4	13-Jul-22	Ephem, Plec, Rhyac	7.9					
			RG_FRUL_INV-5	13-Jul-22	Ephem, Plec, Rhyac	9.7					
			RG_FRUL_INV-1	10-Sep-22	Ephem, Plec	7.7	9.6	6.9	10.0	8.8	1.4
			RG_FRUL_INV-2	10-Sep-22	Plec, Ephem	9.8					
			RG_FRUL_INV-3	10-Sep-22	Plec, Ephem Tipul	6.9					
			RG_FRUL_COMPOLI-4	10-Sep-22	Plec, Ephem, Oligo	9.6					
			RG_FRUL_INV-5	10-Sep-22	Plec, Ephem, Tipul	10					
			RG_FRUL_INVOLI	10-Sep-22	Oligo	65	NA	NA	NA	NA	NA
			RG_FRUL_INV-1	29-Nov-22	Plec, Ephem	9.7	9.5	9.0	11.0	9.7	0.8
			RG_FRUL_INV-2	29-Nov-22	Plec, Ephem	9					
			RG_FRUL_INV-3	29-Nov-22	Plec, Ephem, Tipul	9.5					
			RG_FRUL_INV-4	29-Nov-22	Ephem, Plec, Tipul	11					
			RG_FRUL_INV-5	29-Nov-22	Plec, Ephem, Tipul	9.5					
		RG-FO23	RG_FO23_INV-1	4-May-22	Plec, Ephem, Rhyac	7.0	7.0	5.3	8.7	6.9	1.2
			RG_FO23_INV-2	4-May-22	Plec, Ephem, Dipt	5.3					
			RG_FO23_INV-3	4-May-22	Plec, Ephem, Dipt	6.6					
			RG_FO23_INV-4	4-May-22	Ephem, Plec	7.0					
			RG_FO23_INV-5	4-May-22	Plec, Ephem	8.7					
			RG_FO23_INV-1	11-Jul-22	Ephem, Plec, Rhyac	7.1	7.1	6.4	10.0	7.9	1.5
			RG_FO23_INV-2	11-Jul-22	Plec, Ephem, Rhyac	10.0					
			RG_FO23_INV-3	11-Jul-22	Ephem, Plec, Trich	8.9					
			RG_FO23_INV-4	11-Jul-22	Plec, Ephem, Para	6.9					
			RG_FO23_INV-5	11-Jul-22	Plec, Ephem, Rhyac	6.4					
			RG_FO23_INV-1	9-Sep-22	Plec, Ephem, Dipt	8.1	8.1	5.7	11.0	8.5	2.4
			RG_FO23_INV-2	9-Sep-22	Plec, Ephem	5.7					
			RG_FO23_INV-3	9-Sep-22	Plec, Ephem	6.8					
			RG_FO23_INV-4	9-Sep-22	Plec, Ephem, Tipul	11.0					
			RG_FO23_INV-5	10-Sep-22	Plec, Ephem	11.0					

Notes: Abbreviation of taxa was used. Plec = Plecoptera (stonefly). Ephem = Ephemeroptera (mayfly). Trich = Trichoptera (caddisfly). Dipt = Diptera (true flies). Oligo = Oligo (worms). Chiron = Chironomidae (non-biting midge). Tipul = Tipulidae (crane fly). Rhyac = Rhyacophilidae. Para = Parapsyche. Nema = Nematoda. Oligo Only = annelids only samples (which is not included in the analysis of composite-taxa and were collected based on annelids at >5% of the total biomass sample [Golder 2021b]). NA = not applicable. "-" = no data.

Table D.2: Results Table for the Asymmetric 2-way ANOVA Model Comparing Benthic Invertebrate Selenium Concentrations During Each Operational Period[a] at RG_LILC3 Area Relative to the Reference Areas (RG_LI24 and RG_SLINE)

ANOVA Model					
Term	DF	SS[b]	MS[c]	F-Ratio	P-Value
Period	5	1.5	0.29	44	<0.001
CI	1	10	10	1,444	<0.001
Period×CI	5	4.7	0.94	143	<0.001
Time(Period)	24	2.2	0.090	14	<0.001
Time(Period)×CI	24	1.8	0.075	11	<0.001
Error	563	-			

Contrasts (P-value and Magnitude of Difference)[d]				
Period 1	**Period 2**		**P-value**	**MOD**
B	AOP (2022_5)		ns	-
	AOP (2022_7)		ns	-
	AOP (2022_9)		ns	-
	AOP (2022_12)		ns	-
AWTF (2016_9)	AOP (2022_5)		<0.001	-10.0 SD
	AOP (2022_7)		<0.001	-10.5 SD
	AOP (2022_9)		<0.001	-9.80 SD
	AOP (2022_12)		<0.001	-10.1 SD
AWTF (2017_4)	AOP (2022_5)		<0.001	-9.99 SD
	AOP (2022_7)		<0.001	-10.5 SD
	AOP (2022_9)		<0.001	-9.83 SD
	AOP (2022_12)		<0.001	-10.1 SD
AWTF (2017_9)	AOP (2022_5)		<0.001	-6.73 SD
	AOP (2022_7)		<0.001	-7.23 SD
	AOP (2022_9)		<0.001	-6.56 SD
	AOP (2022_12)		<0.001	-6.82 SD

P-value for **Period×CI** or **Time(Period)×CI** factors < 0.1

Contrast P-value < 0.1/16 and in an increasing direction

Contrast P-value < 0.1/16 and in a decreasing direction

Notes: "-" = not relevant; ns = no significance; df = degrees of freedom. Selenium results from RG_LI24 collected on May 3, 2018 were excluded from the analyses because these were identified as anomalous, and likely the result of a field error.

[a] Operational periods include: the Before (B), AWTF Operational (AWTF), Initial Operation (IO), Shut Down (SD), Restart (RS), and AWTF with AOP Operational (AOP) Periods.

[b] SS = sum of squares of ANOVA model.

[c] MS = mean sum of squares of ANOVA model.

[d] Magnitude of difference (MOD) was calculated as the difference in period 2 - difference in period 1/pooled standard deviation (SD).

Table D.3: Results Table for the Asymmetric 2-way ANOVA Model Comparing Benthic Invertebrate Selenium Concentrations During Each Operational Period[a] at RG_LIDSL Area Relative to the Reference Areas (RG_LI24 and RG_SLINE)

ANOVA Model					
Term	DF	SS[b]	MS[c]	F-Ratio	P-Value
Period	5	0.38	0.08	12	<0.001
CI	1	0.79	0.79	120	<0.001
Period×CI	5	2.1	0.42	64	<0.001
Time(Period)	23	2.2	0.097	15	<0.001
Time(Period)×CI	23	1.1	0.049	7.4	<0.001
Error	554	-			

Contrasts (P-value and Magnitude of Difference)[d]				
Period 1	**Period 2**		**P-value**	**MOD**
B	AOP (2022_5)		<0.001	-4.7 SD
	AOP (2022_7)		ns	-
	AOP (2022_9)		ns	-
	AOP (2022_12)		ns	-
AWTF (2016_9)	AOP (2022_5)		<0.001	-9.6 SD
	AOP (2022_7)		<0.001	-7.3 SD
	AOP (2022_9)		<0.001	-6.3 SD
	AOP (2022_12)		<0.001	-6.4 SD
AWTF (2017_4)	AOP (2022_5)		<0.001	-6.9 SD
	AOP (2022_7)		<0.001	-4.6 SD
	AOP (2022_9)		<0.001	-3.6 SD
	AOP (2022_12)		<0.001	-3.7 SD
AWTF (2017_9)	AOP (2022_5)		<0.001	-7.6 SD
	AOP (2022_7)		<0.001	-5.3 SD
	AOP (2022_9)		<0.001	-4.3 SD
	AOP (2022_12)		<0.001	-4.4 SD

P-value for **Period×CI** or **Time(Period)×CI** factors < 0.1

Contrast P-value < 0.1/16 and in an increasing direction

Contrast P-value < 0.1/16 and in a decreasing direction

Notes: "-" = not relevant; ns = no significance; df = degrees of freedom. Selenium results from RG_LI24 collected on May 3, 2018 were excluded from the analyses because these were identified as anomalous, and likely the result of a field error.

[a] Operational periods include: the Before (B), AWTF Operational (AWTF), Initial Operation (IO), Shut Down (SD), Restart (RS), and AWTF with AOP Operational (AOP) Periods.

[b] SS = sum of squares of ANOVA model.

[c] MS = mean sum of squares of ANOVA model.

[d] Magnitude of difference (MOD) was calculated as the difference in period 2 - difference in period 1/pooled standard deviation (SD).

Table D.4: Results Table for the Asymmetric 2-way ANOVA Model Comparing Benthic Invertebrate Selenium Concentrations at RG_LILC3 Within 2022 Relative to the Reference Areas (RG_LI24 and RG_SLINE)

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	5	1.5	0.29	44	<0.001
CI	1	10	10	1,444	<0.001
Period×CI	5	4.7	0.94	143	<0.001
Time(Period)	24	2.2	0.090	14	<0.001
Time(Period)×CI	24	1.8	0.075	11	<0.001
Error	563	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2022_5	2022_7		ns	-
	2022_9		ns	-
	2022_12		ns	-
2022_7	2022_9		ns	-
	2022_12		ns	-
2022_9	2022_12		ns	-

P-value for **Period×CI** or **Time(Period)×CI** factors < 0.1

Contrast P-value < 0.1/6 and in an increasing direction

Contrast P-value < 0.1/6 and in a decreasing direction

Notes: "-" = not relevant; ns = not significance; df = degrees of freedom. Selenium results from RG_LI24 collected on May 3, 2018 were excluded from the analyses because these were identified as anomalous, and likely the result of a field error.

[a] SS = sum of squares of ANOVA model.

[b] MS = mean sum of squares of ANOVA model.

[c] Magnitude of difference (MOD) was calculated as the difference in period 2 - difference in period 1/pooled standard deviation (SD).

Table D.5: Results Table for the Asymmetric 2-way ANOVA Model Comparing Benthic Invertebrate Selenium Concentrations at RG_LIDSL Within 2022 Relative to the Reference Areas (RG_LI24 and RG_SLINE)

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	5	0.38	0.077	12	<0.001
CI	1	0.79	0.79	120	<0.001
Period×CI	5	2.1	0.42	64	<0.001
Time(Period)	23	2.2	0.097	15	<0.001
Time(Period)×CI	23	1.1	0.049	7.4	<0.001
Error	554	-			
Contrasts (P-value and Magnitude of Difference)[c]					
Period 1	**Period 2**			**P-value**	**MOD**
2022_5	2022_7			0.003	2.31 SD
	2022_9			<0.001	3.29 SD
	2022_12			<0.001	3.21 SD
2022_7	2022_9			ns	-
	2022_12			ns	-
2022_9	2022_12			ns	-

P-value for **Period×CI** or **Time(Period)×CI** factors < 0.1

Contrast P-value < 0.1/6 and in an increasing direction

Contrast P-value < 0.1/6 and in a decreasing direction

Notes: "-" = not relevant; ns = not significance; df = degrees of freedom. Selenium results from RG_LI24 collected on May 3, 2018 were excluded from the analyses because these were identified as anomalous, and likely the result of a field error.

[a] SS = sum of squares of ANOVA model.

[b] MS = mean sum of squares of ANOVA model.

[c] Magnitude of difference (MOD) was calculated as the difference in period 2 - difference in period 1/pooled standard deviation (SD).

Table D.6: Results Table for the Asymmetric 2-way ANOVA Model Comparing Benthic Invertebrate Selenium Concentrations at RG_LILC3 Within the AWTF with AOP Operational Period Relative to the Reference Areas (RG_LI24 and RG_SLINE)

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	5	1.5	0.29	44	<0.001
CI	1	10	10	1,444	<0.001
Period×CI	5	4.7	0.94	143	<0.001
Time(Period)	24	2.2	0.090	14	<0.001
Time(Period)×CI	24	1.8	0.075	11	<0.001
Error	563	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2019_4	2020_4		ns	-
	2021_4		ns	-
	2022_5		ns	-
2019_7	2020_7		ns	-
	2021_7		ns	-
	2022_7		ns	-
2019_9	2020_9		ns	-
	2021_9		ns	-
	2021_9		ns	-
2019_12	2020_12		<0.001	-3.74 SD
	2021_12		<0.001	-5.38 SD
	2022_12		<0.001	-3.39 SD

P-value for **Period×CI** or **Time(Period)×CI** factors < 0.1

Contrast P-value < 0.1/12 and in an increasing direction

Contrast P-value < 0.1/12 and in a decreasing direction

Notes: "-" = not relevant; ns = not significance; df = degrees of freedom. Selenium results from RG_LI24 collected on May 3, 2018 were excluded from the analyses because these were identified as anomalous, and likely the result of a field error.

[a] SS = sum of squares of ANOVA model.

[b] MS = mean sum of squares of ANOVA model.

[c] Magnitude of difference (MOD) was calculated as the difference in period 2 - difference in period 1/pooled standard deviation (SD).

Table D.7: Results Table for the Asymmetric 2-way ANOVA Model Comparing Benthic Invertebrate Selenium Concentrations at RG_LIDSL Within the AWTF with AOP Operational Period Relative to the Reference Areas (RG_LI24 and RG_SLINE)

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	5	0.38	0.08	12	<0.001
CI	1	0.79	0.79	120	<0.001
Period×CI	5	2.1	0.42	64	<0.001
Time(Period)	23	2.2	0.097	15	<0.001
Time(Period)×CI	23	1.1	0.049	7.4	<0.001
Error	554	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2019_4	2020_4		ns	2.31 SD
	2021_4		ns	-
	2022_5		0.006	-1.87 SD
2019_7	2020_7		ns	-
	2021_7		ns	-
	2022_7		ns	-
2019_9	2020_9		ns	-
	2021_9		ns	-
	2021_9		ns	-
2019_12	2020_12		<0.001	-3.43 SD
	2021_12		<0.001	-3.98 SD
	2022_12		ns	-

P-value for **Period×CI** or **Time(Period)×CI** factors < 0.1

Contrast P-value < 0.1/12 and in an increasing direction

Contrast P-value < 0.1/12 and in a decreasing direction

Notes: "-" = not relevant; ns = not significance; df = degrees of freedom. Selenium results from RG_LI24 collected on May 3, 2018 were excluded from the analyses because these were identified as anomalous, and likely the result of a field error.

[a] SS = sum of squares of ANOVA model.

[b] MS = mean sum of squares of ANOVA model.

[c] Magnitude of difference (MOD) was calculated as the difference in period 2 - difference in period 1/pooled standard deviation (SD).

Table D.8: ANOVA Comparison of Benthic Invertebrate Tissue Concentrations at Among Years Before and After Lab Change At RG_SLINE, 2017 to 2022

ANOVA		Month	Magnitude of Differences from Base Year[a]						Differences Among Years[b]					
			Before			After			Before			After		
			2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022
Term	**P-value**	April	Base Year	**38**	**46**	**90**	**61**	**87**	C	B	B	A	AB	AB
Year	<0.001	July	-	-	Base Year	7.8	24	1.0	-	-	A	A	A	A
Month	<0.001	September	Base Year	**44**	12	40	58	**42**	C	AB	BC	AB	A	AB
Year x Month	<0.001	December	-	Base Year	**-36**	**73**	**84**	**83**	-	B	C	A	A	A

Relevant p-value < 0.05
> 20% Decrease in concentration
> 33% Decrease in concentration
> 43% Decrease in concentration
> 50% Decrease in concentration
> 25% Increase in concentration
> 50% Increase in concentration
> 75% Increase in concentration
> 100% Increase in concentration
***Bold** Significant increase or decrease from base year ($\alpha = 0.05$)

Notes: "-" = no data, BIT = Benthic invertebrate tissue.

[a] Magnitude of difference calculated as ($Year_i$ - Base Year)/Base Year x 100% with the significance of the comparison determined using a Tukey's Honestly Significant Difference (HSD) test.

[b] Years that do not share a letter were identified as being significantly different in a Tukey's HSD test ($\alpha = 0.05$).

Table D.9: Geometric Means of Benthic Invertebrate Biomass for Major Taxonomic Groups Over Time at RG SLINE, 2014 to 2022

Year	Ephemeroptera		Plecoptera		Trichoptera		Diptera	
	Biomass (g/m^2)	% of Total Biomass	Biomass (g/m^2)	% of Total Biomass	Biomass (g/m^2)	% of Total Biomass	Biomass (g/m^2)	% of Total Biomass
2014	2.03	41.0	1.18	23.8	0.599	12.1	0.411	8.31
2015	3.07	29.1	4.02	38.1	1.53	14.5	0.709	6.73
2016	1.53	29.3	1.08	20.8	1.25	24.0	0.512	9.85
2017	1.44	29.1	0.825	16.6	0.729	14.7	0.785	8.52
2018	0.850	9.94	1.46	17.1	2.27	26.6	0.520	6.09
2019	2.69	36.5	1.80	24.4	1.41	19.2	0.612	8.30
2020	2.78	34.0	1.74	21.2	2.36	28.8	0.558	6.81
2021	1.70	24.8	2.76	40.2	0.994	14.5	0.506	7.36
2022	1.90	19.2	2.16	21.7	2.27	22.9	0.629	6.34

Note: Biomass samples were taken in September

Table D.10: Dominant Taxa in Composite-Taxa Tissue Samples Collected at RG_SLINE, 2014 to 2022[a]

Year	April	July	September[b]	December
2014	-	-	-	-
2015	-	-	-	-
2016	-	-	-	-
2017	-	-	-	-
2018	-	-	Trichoptera, Plecoptera	Plecoptera, Trichoptera
2019	Plecoptera, Trichoptera, Ephemeroptera	-	Trichoptera, Plecoptera	-
2020	Plecoptera, Trichoptera, Ephemeroptera	-	Trichoptera, Ephemeroptera, Plecoptera	Plecoptera, Ephemeroptera, Trichoptera
2021	Ephemeroptera, Plecoptera, Trichoptera	Ephemeroptera, Trichoptera, Plecoptera	Plecoptera, Ephemeroptera, Trichoptera	Plecoptera, Trichoptera, Ephemeroptera
2022	Ephemeroptera, Plecoptera	Ephemeroptera, Plecoptera, Trichoptera	Plecoptera, Ephemeroptera, Trichoptera	Ephemeroptera, Plecoptera, Trichoptera

Note: "-" indicates no data available. April sampling was conducted in early May in 2022.

[a] Dominant taxa were assessed using visual estimates of biomass. Taxa in table represent a summary of taxa dominance across stations.

[b] September sampling for composite-taxa tissue was sampled concurrently with Hess sampling (see Table D.14).

Table D.11: Physical Measures and Tissue Selenium Concentrations for Westslope Cutthroat Trout Sampled from Line Creek, 2001 to 2022

AWTF Operation Phase	Waterbody	Area	Year	Capture Location UTM (NAD83, 11U)		Study	Processing Date	Fish ID	Total Length	Fork Length	Body Weight	Sex[a]	Age	Tissue Selenium (mg/kg dw)				Recorded Deformities (DELT)[d]
				Easting	Northing				(cm)	(cm)	(g)			Muscle	Ovary	Egg[b]	Estimated Ovary[c]	
Prior to AWTF Operation	Line Creek	RG_LI8	2001	654480	5529034	Golder 2005	Apr-2001	L1-1	-	34.0	530	M	5	9.2	-	-	-	-
		RG_LI8	2001	654480	5529034		Apr-2001	L1-2	-	32.0	475	M	3	8.1	-	-	-	-
		RG_LI8	2001	654480	5529034		Apr-2001	L1-4	-	34.6	680	M	4	8.5	-	-	-	-
		RG_LI8	2001	654480	5529034		Apr-2001	L1-3	-	36.1	725	F	4	8.4	15	-	-	-
		RG_LI8	2001	654480	5529034		Apr-2001	L1-5	-	32.9	550	F	4	9.8	16	-	-	-
		RG_LI8	2001	654480	5529034		Apr-2001	L1-6	-	32.5	500	F	5	8.5	16	-	-	-
		RG_LI8	2002	654480	5529034		Apr-2002	LN-1	-	38.5	780	M	7	8.0	-	-	-	-
		RG_LI8	2002	654480	5529034		Apr-2002	LN-2	-	39.0	750	F	7	16	20	-	-	-
		RG_LI8	2002	654480	5529034		Apr-2002	LN-3	-	34.7	615	F	5	7.0	14	-	-	-
		RG_LI8	2002	654480	5529034		Apr-2002	LN-4	-	32.5	480	F	6	8.0	19	-	-	-
		RG_LI8	2002	654480	5529034		Apr-2002	LN-5	-	34.5	550	F	7	7.0	14	-	-	-
		RG_LI8	2002	654480	5529034		Apr-2002	LN-6	-	37.8	785	F	6	7.0	14	-	-	-
		RG_LI8	2002	654480	5529034		Apr-2002	LN-7	-	38.5	850	F	7	9.0	16	-	-	-
		RG_LI8	2002	654480	5529034		Apr-2002	LN-8	-	33.6	525	F	6	7.0	13	-	-	-
		RG_LI8	2002	654480	5529034		Apr-2002	LN-9	-	30.1	400	F	5	7.0	14	-	-	-
		RG_LI8	2002	654480	5529034		Apr-2002	LN-10	-	37.8	675	F	6	8.0	14	-	-	-
		RG_LIDSL	2003	659281	5530548	Minnow 2004	Jul-2003	LC-CT1	-	39.1	800	M	6	7.2	-	-	-	-
		RG_LIDSL	2003	659281	5530548		Jul-2003	LC-CT2	-	34.8	700	F	4	6.4	-	-	10	-
		RG_LIDSL	2003	659281	5530548		Jul-2003	LC-CT3	-	31.5	470	F	4	7.4	-	-	12	-
		RG_LI8	2006	657406	5529218	Minnow et al. 2007	Apr-2006	LI8001	-	30.6	435	F	5	7.9	11	-	-	-
		RG_LI8	2006	657406	5529218		Apr-2006	LI8002	-	31.7	427	F	5	7.7	11	-	-	-
		RG_LI8	2006	657406	5529218		Apr-2006	LI8003	-	27.4	288	F	5	7.4	21	-	-	-
		RG_LI8	2006	657406	5529218		Apr-2006	LI8004	-	21.4	132	F	6	15	11	-	-	-
		RG_LI8	2006	657406	5529218		Apr-2006	LI8005	-	20.5	117	F	5	13	15	-	-	-

Muscle selenium concentration exceeding the site-specific benchmark for WCT of 15.5 mg/kg dw (Nautilus and Interior Reforestation 2011).

Ovary selenium concentration exceeding the Level 1 site-specific benchmark (equivalent of EC_{10}) for WCT of 25 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).

Ovary selenium concentration exceeding the Level 2 site-specific benchmark (equivalent of EC_{20}) for WCT of 27 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).

Ovary selenium concentration exceeding the Level 3 site-specific benchmark (equivalent of EC_{50}) for WCT of 33 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).

Notes: "-" = no data recorded; AWTF = Active Water Treatment Facility; LCO = Line Creek Operations; LAEMP = Local Aquatic Effects Monitoring Program; AOP = Advanced Oxidation Process.

[a] F = female; M = male; U = unknown (sex of fish could not be determined, either because fish was not sufficiently mature or samples were collected non-lethally and sex could not be determined based on non-lethal evaluation of physical characteristics).

[b] Ripe egg tissue was collected from one individual sampled non-lethally in 2019. Although westslope cutthroat trout spawn in the spring, this female released ripe eggs with minimal abdominal pressure during the collection of physical measures (length and weight).

[c] Ovary concentrations were estimated from muscle selenium concentrations based on the average ovary-to-muscle concentration relationship of 1.6:1 presented by Nautilus and Interior Reforestation (2011). Ovary selenium was estimated only for individuals lacking measured egg/ovary concentrations (if female) or if sex was unknown.

[d] DELT = Deformities, erosions, lesions, tumors. - = DELT observations were not recorded. DELT observations were initiated in 2017 following the start of AWTF operation.

Table D.11: Physical Measures and Tissue Selenium Concentrations for Westslope Cutthroat Trout Sampled from Line Creek, 2001 to 2022

AWTF Operation Phase	Waterbody	Area	Year	Capture Location UTM (NAD83, 11U)		Study	Processing Date	Fish ID	Total Length	Fork Length	Body Weight	Sex[a]	Age	Tissue Selenium (mg/kg dw)				Recorded Deformities (DELT)[d]
				Easting	Northing				(cm)	(cm)	(g)			Muscle	Ovary	Egg[b]	Estimated Ovary[c]	
Prior to AWTF Operation	Line Creek	RG_LI8	2009	657406	5529218	Minnow et al. 2011	Sep-2009	LI8a	-	30.5	435	F	5	12	-	-	18	-
		RG_LI8	2009	657406	5529218		Sep-2009	LI8b	-	28.8	327	F	6	11	-	-	17	-
		RG_LI8	2009	657406	5529218		Sep-2009	LI8c	-	22.1	184	F	6	11	-	-	18	-
		RG_LI8	2009	657406	5529218		Sep-2009	LI8d	-	21.2	112	F	4	14	-	-	22	-
		RG_LI8	2009	657406	5529218		Sep-2009	LI8e	-	21.3	132	F	4	13	-	-	21	-
		RG_LILC3	2012	660085	5532021	Minnow 2014	24-May-12	LILC3-WCT1	-	21.1	135	F	-	10	-	-	16	-
		RG_LILC3	2012	660085	5532021		24-May-12	LILC3-WCT2	-	18.2	63	U	-	7.2	-	-	12	-
		RG_LILC3	2012	660085	5532021		24-May-12	LILC3-WCT3	-	18.0	58	U	-	9.2	-	-	15	-
		RG_LILC3	2012	660085	5532021		24-May-12	LILC3-WCT4	-	17.7	57	U	-	6.8	-	-	11	-
		RG_LILC3	2012	660085	5532021		1-Jun-12	LILC3-WCT5	-	20.0	79	M	-	6.6	-	-	-	-
AWTF Steady State Operation	Line Creek	RG_LI8	2017	655320	5529059	2017 LCO LAEMP (Minnow 2018d)	7-Sep-17	LI8-WCT-01	36.7	35.1	645	U	-	6.9	-	-	11	None
		RG_LI8	2017	655320	5529059		7-Sep-17	LI8-WCT-02	44.6	42.8	1,005	U	-	7.8	-	-	12	Slight jaw malformation
		RG_LI8	2017	655320	5529059		7-Sep-17	LI8-WCT-03	32.1	30.4	382	U	-	7.8	-	-	12	None
		RG_LI8	2017	655320	5529059		8-Sep-17	LI8-WCT-04	40.1	38.7	750	U	-	7.8	-	-	12	Bite on stomach from another fish
		RG_LI8	2017	655320	5529059		8-Sep-17	LI8-WCT-05	31.7	30.5	355	U	-	8.6	-	-	14	None
		RG_LIDCOM	2017	658185	5529820		28-Apr-17	LIDCOM-WCT-01	36.5	35.5	570	U	-	12	-	-	20	None
		RG_LIDSL	2017	659293	5530590		26-Apr-17	LIDSL-WCT-01	27.0	26.5	220	U	-	25	-	-	40	None
		RG_LIDSL	2017	659293	5530590		8-Sep-17	LIDSL-WCT-01	41.4	39.8	885	U	-	34	-	-	54	None
		RG_LILC3	2017	659892	5531560		8-Sep-17	LILC3-WCT-02	30.7	29.4	345	U	-	26	-	-	42	Bite marks from another fish
		RG_LILC3	2017	659892	5531560		8-Sep-17	LILC3-WCT-03	26.2	25.3	230	U	-	14	-	-	22	None
		RG_LILC3	2017	659892	5531560		8-Sep-17	LILC3-WCT-04	27.4	26.2	230	U	-	24	-	-	38	None
		RG_LILC3	2017	659892	5531560		8-Sep-17	LILC3-WCT-05	23.4	22.2	122	U	-	42	-	-	67	None

Muscle selenium concentration exceeding the site-specific benchmark for WCT of 15.5 mg/kg dw (Nautilus and Interior Reforestation 2011).

Ovary selenium concentration exceeding the Level 1 site-specific benchmark (equivalent of EC_{10}) for WCT of 25 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).

Ovary selenium concentration exceeding the Level 2 site-specific benchmark (equivalent of EC_{20}) for WCT of 27 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).

Ovary selenium concentration exceeding the Level 3 site-specific benchmark (equivalent of EC_{50}) for WCT of 33 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).

Notes: "-" = no data recorded; AWTF = Active Water Treatment Facility; LCO = Line Creek Operations; LAEMP = Local Aquatic Effects Monitoring Program; AOP = Advanced Oxidation Process.

[a] F = female; M = male; U = unknown (sex of fish could not be determined, either because fish was not sufficiently mature or samples were collected non-lethally and sex could not be determined based on non-lethal evaluation of physical characteristics).

[b] Ripe egg tissue was collected from one individual sampled non-lethally in 2019. Although westslope cutthroat trout spawn in the spring, this female released ripe eggs with minimal abdominal pressure during the collection of physical measures (length and weight).

[c] Ovary concentrations were estimated from muscle selenium concentrations based on the average ovary-to-muscle concentration relationship of 1.6:1 presented by Nautilus and Interior Reforestation (2011). Ovary selenium was estimated only for individuals lacking measured egg/ovary concentrations (if female) or if sex was unknown.

[d] DELT = Deformities, erosions, lesions, tumors. - = DELT observations were not recorded. DELT observations were initiated in 2017 following the start of AWTF operation.

Table D.11: Physical Measures and Tissue Selenium Concentrations for Westslope Cutthroat Trout Sampled from Line Creek, 2001 to 2022

AWTF Operation Phase	Waterbody	Area	Year	Capture Location UTM (NAD83, 11U)		Study	Processing Date	Fish ID	Total Length	Fork Length	Body Weight	Sex[a]	Age	Tissue Selenium (mg/kg dw)				Recorded Deformities (DELT)[d]
				Easting	Northing				(cm)	(cm)	(g)			Muscle	Ovary	Egg[b]	Estimated Ovary[c]	
AWTF Shutdown	Line Creek	RG_LIDCOM	2018	658135	5529841	2018 LCO LAEMP (Minnow 2019a)	30-Apr-18	LIDCOM-WCT-01	35.2	34.6	450	U	-	14	-	-	22	-
		RG_LIDSL	2018	659232	5530500		20-Aug-18	RG_LIDSL_WCT-2-M_20180820	-	17.8	83	U	-	11	-	-	18	None
		Mid-Canyon	2018	656825	5529140		21-Aug-18	RG_LI8_WCT-2-M_20180821	-	19.5	99	U	-	7.9	-	-	13	None
		Mid-Canyon	2018	656825	5529140		21-Aug-18	RG_LI8_WCT-3-M_20180821	-	30.3	315	U	-	8.7	-	-	14	None
		Mid-Canyon	2018	656825	5529140		21-Aug-18	RG_LI8_WCT-4-M_20180821	-	32.0	414	U	-	9.8	-	-	16	None
		Mid-Canyon	2018	656825	5529140		21-Aug-18	RG_LI8_WCT-5-M_20180821	-	24.6	182	U	-	8.8	-	-	14	None
		RG_LIDCOM	2018	658185	5529798		12-Sep-18	RG_LIDCOM_WCT-1-M_20180912	30.4	29.1	345	U	-	25	-	-	40	None
		RG_LI8	2018	654584	5529020		12-Sep-18	RG_LI8_WCT-1-M_20180912	26.2	24.9	210	U	-	9.5	-	-	15	None
	Fording River	RG_FO23	2018	652956	5528903		05-Sep-18	RG_FO23_WCT-1-M_20180905	40.0	38.5	710	U	-	10	-	-	16	None
		RG_FO23	2018	652956	5528903		05-Sep-18	RG_FO23_WCT-2-M_20180905	41.4	38.8	730	U	-	7.2	-	-	12	Angling scarring around mouth
		RG_FO23	2018	652956	5528903		05-Sep-18	RG_FO23_WCT-3-M_20180905	34.9	33.4	455	U	-	7.0	-	-	11	None
		RG_FO23	2018	652956	5528903		05-Sep-18	RG_FO23_WCT-4-M_20180905	32.4	30.3	310	U	-	9.5	-	-	15	None
		RG_FO23	2018	652956	5528903		05-Sep-18	RG_FO23_WCT-5-M_20180905	22.7	21.5	121	U	-	7.5	-	-	12	None
		RG_FO23	2018	652874	5528402		05-Sep-18	RG_FO23_WCT-6-M_20180905	42.0	40.2	750	U	-	9.0	-	-	14	None
		RG_FO23	2018	652874	5528402		05-Sep-18	RG_FO23_WCT-7-M_20180905	33.2	31.4	385	U	-	6.0	-	-	10	Scarring around mouth
		RG_FO23	2018	652874	5528402		05-Sep-18	RG_FO23_WCT-8-M_20180905	30.8	29.2	315	U	-	13	-	-	21	None
After AWTF/AOP Operations Stabilize	Line Creek	RG_LILC3	2019	659870	5531576	2019 LCO LAEMP (Minnow 2020a)	05-Sep-19	RG_LILC3_WCT-01	20.7	19.7	98	F	SA	7.9	-	-	13	None
		RG_LILC3	2019	659870	5531576		06-Sep-19	RG_LILC3_WCT-04	41.7	39.2	945	M	A	10	-	-	16	None
		RG_LIDCOM	2019	658185	5529820		05-Sep-19	RG_LIDCOM_WCT-02	37.5	35.5	625	F	A	11	-	-	18	None
		RG_LIDCOM	2019	658185	5529820		05-Sep-19	RG_LIDCOM_WCT-03	40.7	39.0	840	M	A	6.2	-	-	10	None
		RG_LIDCOM	2019	658185	5529820		06-Sep-19	RG_LIDCOM_WCT-05	32.2	30.7	420	M	A	7.6	-	-	12	None
		RG_LIDCOM	2019	658185	5529820		06-Sep-19	RG_LIDCOM_WCT-06	38.1	36.5	840	M	A	7.4	-	-	12	None
		RG_LIDCOM	2019	658185	5529820		06-Sep-19	RG_LIDCOM_WCT-07	34.3	32.9	545	M	A	7.9	-	-	13	None
		RG_LIDCOM	2019	658185	5529820		06-Sep-19	RG_LIDCOM_WCT-08	29.9	28.7	360	F	A	10	-	-	16	None
		RG_LI8	2019	655378	5529048		06-Sep-19	RG_LI8_WCT-01	48.5	46.8	1,140	M	A	7.7	-	-	12	None
		RG_LI8	2019	655378	5529048		06-Sep-19	RG_LI8_WCT-02	33.2	32.0	410	F	A	7.2	-	-	12	None
		RG_LI8	2019	654671	5529013		07-Sep-19	RG_LI8_WCT-03	36.3	35.0	515	F	A	8.1	-	-	13	None
		RG_LI8	2019	654671	5529013		07-Sep-19	RG_LI8_WCT-04	25.6	24.5	195	M	A	6.5	-	-	10	None
		RG_LI8	2019	654671	5529013		07-Sep-19	RG_LI8_WCT-05	44.7	43.3	900	F	A	20	-	28	-	None
		RG_LI8	2019	655378	5529048		07-Sep-19	RG_LI8_WCT-06	45.2	43.4	980	F	A	8.2	-	-	13	None
		RG_LI8	2019	655378	5529048		07-Sep-19	RG_LI8_WCT-07	40.6	39	760	M	A	7.0	-	-	11	None

Muscle selenium concentration exceeding the site-specific benchmark for WCT of 15.5 mg/kg dw (Nautilus and Interior Reforestation 2011).

Ovary selenium concentration exceeding the Level 1 site-specific benchmark (equivalent of EC_{10}) for WCT of 25 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).

Ovary selenium concentration exceeding the Level 2 site-specific benchmark (equivalent of EC_{20}) for WCT of 27 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).

Ovary selenium concentration exceeding the Level 3 site-specific benchmark (equivalent of EC_{50}) for WCT of 33 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).

Notes: "-" = no data recorded; AWTF = Active Water Treatment Facility; LCO = Line Creek Operations; LAEMP = Local Aquatic Effects Monitoring Program; AOP = Advanced Oxidation Process.

[a] F = female; M = male; U = unknown (sex of fish could not be determined, either because fish was not sufficiently mature or samples were collected non-lethally and sex could not be determined based on non-lethal evaluation of physical characteristics).

[b] Ripe egg tissue was collected from one individual sampled non-lethally in 2019. Although westslope cutthroat trout spawn in the spring, this female released ripe eggs with minimal abdominal pressure during the collection of physical measures (length and weight).

[c] Ovary concentrations were estimated from muscle selenium concentrations based on the average ovary-to-muscle concentration relationship of 1.6:1 presented by Nautilus and Interior Reforestation (2011). Ovary selenium was estimated only for individuals lacking measured egg/ovary concentrations (if female) or if sex was unknown.

[d] DELT = Deformities, erosions, lesions, tumors. - = DELT observations were not recorded. DELT observations were initiated in 2017 following the start of AWTF operation.

Table D.11: Physical Measures and Tissue Selenium Concentrations for Westslope Cutthroat Trout Sampled from Line Creek, 2001 to 2022

AWTF Operation Phase	Waterbody	Area	Year	Capture Location UTM (NAD83, 11U)		Study	Processing Date	Fish ID	Total Length	Fork Length	Body Weight	Sex[a]	Age	Tissue Selenium (mg/kg dw)				Recorded Deformities (DELT)[d]
				Easting	Northing				(cm)	(cm)	(g)			Muscle	Ovary	Egg[b]	Estimated Ovary[c]	
After AWTF/AOP Operations Stabilize	Line Creek	RG_LIDSL	2021	659876	5531584	2021 RAEMP	13-Sep-21	RG_LIDSL_WCT-01_M_2021-09-13	22.7	21.6	124.5	-	-	16	-	-	26	None
		RG_LIDSL	2021	659876	5531584		13-Sep-21	RG_LIDSL_WCT-02_M_2021-09-13	27.2	26.1	216	-	-	6.1	-	-	10	None
		RG_LIDSL	2021	659876	5531584		13-Sep-21	RG_LIDSL_WCT-03_M_2021-09-13	31.4	29.9	395	-	-	18	-	-	29	None
		RG_LIDSL	2021	659876	5531584		13-Sep-21	RG_LIDSL_WCT-04_M_2021-09-13	29.4	28.2	315	-	-	17	-	-	27	None
		RG_LIDSL	2021	659876	5531584		13-Sep-21	RG_LIDSL_WCT-05_M_2021-09-13	32.7	31.4	440	-	-	17	-	-	27	None
		RG_LIDSL	2021	658119	5529814		13-Sep-21	RG_LIDSL_WCT-06_M_2021-09-13	27.4	26.5	256	-	-	7.1	-	-	11	None
		RG_LIDSL	2021	658119	5529814		13-Sep-21	RG_LIDSL_WCT-07_M_2021-09-13	44.5	42.4	1075	-	-	4.3	-	-	7	None
		RG_LIDSL	2021	658119	5529814		13-Sep-21	RG_LIDSL_WCT-08_M_2021-09-13	29.9	28.7	355	-	-	6.5	-	-	10	None
	Fording River	RG_FO23	2021	652808	5528334		13-Sep-21	RG_FO23_WCT-01_M_2021-09-13	27.9	26.4	255	-	-	9	-	-	14	None
		RG_FO23	2021	652808	5528334		13-Sep-21	RG_FO23_WCT-02_M_2021-09-13	38.4	36.6	595	-	-	8.2	-	-	13	None
		RG_FO23	2021	652808	5528334		14-Sep-21	RG_FO23_WCT-03_M_2021-09-14	45.8	43.7	1110	-	-	11	-	-	18	None
		RG_FO23	2021	652808	5528334		14-Sep-21	RG_FO23_WCT-04_M_2021-09-14	34.9	33.2	490	-	-	7.6	-	-	12	None
		RG_FO23	2021	652808	5528334		14-Sep-21	RG_FO23_WCT-05_M_2021-09-14	32.1	30.9	395	-	-	10	-	-	16	None
		RG_FO23	2021	652808	5528334		14-Sep-21	RG_FO23_WCT-06_M_2021-09-14	38.5	32.7	455	-	-	7	-	-	11	None
		RG_FO23	2021	652808	5528334		14-Sep-21	RG_FO23_WCT-07_M_2021-09-14	29.9	28.3	305	-	-	6.9	-	-	11	None
		RG_FO23	2021	652808	5528334		14-Sep-21	RG_FO23_WCT-08_M_2021-09-14	31.4	29.9	340	-	-	10	-	-	16	None
	Line Creek	RG_LIDSL	2022	659242	5530509	2022 RAEMP	06-Sep-22	RG_LIDSL_WCT-M-1_2022-09-06	32	31	410	-	-	5.6	-	-	9	Upper jaw erosion
		RG_LIDSL	2022	659242	5530509		06-Sep-22	RG_LIDSL_WCT-M-2_2022-09-06	43	42	860	-	-	7.7	-	-	12	None
		RG_LIDSL	2022	659242	5530509		06-Sep-22	RG_LIDSL_WCT-M-3_2022-09-06	31	30	360	-	-	5.2	-	-	8	Jaw lesion
		RG_LIDSL	2022	659242	5530509		06-Sep-22	RG_LIDSL_WCT-M-4_2022-09-06	41	40	800	-	-	7.8	-	-	12	None
		RG_LIDSL	2022	658831	5530074		19-Sep-22	RG_LIDSL_WCT-M-5_2022-09-19	34.8	33	420	-	-	18	-	-	29	Snout erosion, caudal fin and left pectoral fin lesions
		RG_LIDSL	2022	659909	5531548		20-Sep-22	RG_LIDSL_WCT-M-6_2022-09-20	37.8	36.8	680	-	-	9.1	-	-	15	Split dorsal fin, lower caudal lobe erosion
		RG_LIDSL	2022	659909	5531548		20-Sep-22	RG_LIDSL_WCT-M-7_2022-09-20	26.4	25.5	190	-	-	5.9	-	-	9	None
		RG_LIDSL	2022	659909	5531548		20-Sep-22	RG_LIDSL_WCT-M-8_2022-09-20	33.8	32.5	480	-	-	6.8	-	-	11	None

Muscle selenium concentration exceeding the site-specific benchmark for WCT of 15.5 mg/kg dw (Nautilus and Interior Reforestation 2011).
Ovary selenium concentration exceeding the Level 1 site-specific benchmark (equivalent of EC_{10}) for WCT of 25 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).
Ovary selenium concentration exceeding the Level 2 site-specific benchmark (equivalent of EC_{20}) for WCT of 27 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).
Ovary selenium concentration exceeding the Level 3 site-specific benchmark (equivalent of EC_{50}) for WCT of 33 mg/kg dw (Elk Valley Water Quality Plan; Golder 2014).

Notes: "-" = no data recorded; AWTF = Active Water Treatment Facility; LCO = Line Creek Operations; LAEMP = Local Aquatic Effects Monitoring Program; AOP = Advanced Oxidation Process; u/s = upstream.

[a] F = female; M = male; U = unknown (sex of fish could not be determined, either because fish was not sufficiently mature or samples were collected non-lethally and sex could not be determined based on non-lethal evaluation of physical characteristics).

[b] Ripe egg tissue was collected from one individual sampled non-lethally in 2019. Although westslope cutthroat trout spawn in the spring, this female released ripe eggs with minimal abdominal pressure during the collection of physical measures (length and weight).

[c] Ovary concentrations were estimated from muscle selenium concentrations based on the average ovary-to-muscle concentration relationship of 1.6:1 presented by Nautilus and Interior Reforestation (2011). Ovary selenium was estimated only for individuals lacking measured egg/ovary concentrations (if female) or if sex was unknown.

[d] DELT = Deformities, erosions, lesions, tumors. - = DELT observations were not recorded. DELT observations were initiated in 2017 following the start of AWTF operation.

Table D.12: Physical Measures and Tissue Selenium Concentrations for Bull Trout Sampled from Line Creek, 2006 to 2022

AWTF Operation Phase	Area	Year	Capture Location UTM (NAD83, 11U)		Study	Processing Date	Fish ID	Total Length	Fork Length	Body Weight	Sex[a]	Life Stage[b]	Age	Tissue Selenium Concentration (mg/kg dw)				Recorded Deformities (DELT)[d]
			Easting	Northing				(cm)	(cm)	(g)				Muscle	Ovary	Ovary (Estimated[c])	Liver	
Prior to AWTF Operation	RG_LI8	2006	656892	5529139	Minnow et al. 2007	23-Aug-06	LI8101	-	74.0	4,309	M	A	-	4.7	-	-	-	-
	RG_LI8	2006	656892	5529139		23-Aug-06	LI8102	-	63.3	2,948	F	A	-	4.0	-	13	-	-
	RG_LI8	2006	656892	5529139		23-Aug-06	LI8103	-	63.5	2,722	F	A	-	3.1	-	10	-	-
	RG_LI8	2006	656892	5529139		23-Aug-06	LI8104	-	23.3	162	U	J	-	4.4	-	-	-	-
AWTF Steady State Operation	RG_LILC3	2017	659887	5531590	2017 LCO LAEMP (Minnow 2018d)	27-Apr-17	LILC3-BT-01	40.0	38.5	550	-	J	-	26	-	-	-	none
	RG_LIDCOM	2017	658185	5529820		10-Sep-17	LIDCOM-BT-07	77.6	75.2	4,220	M	A	10	5.6	-	-	30	none
	RG_LIDCOM	2017	658185	5529820		11-Sep-17	LIDCOM-BT-11	65.9	63.2	2,660	F	A	-	4.8	16	-	-	none
	RG_LIDCOM	2017	658185	5529820		11-Sep-17	LIDCOM-BT-12	73.6	68.5	3,160	F	A	-	4.4	16	-	-	cut on tail due to tagging
	RG_LILC3	2017	659892	5531560		10-Sep-17	LILC3-BT-06	63.1	60.5	2,260	F	A	8	4.8	12	-	16	none
	RG_LILC3	2017	659892	5531560		11-Sep-17	LILC3-BT-08	61.8	60.0	2,080	F	A	-	3.9	14	-	-	none
	RG_LILC3	2017	659892	5531560		11-Sep-17	LILC3-BT-10	63.2	61.9	1,840	F	A	-	4.5	15	-	-	none
	RG_LILC3	2017	659892	5531560		8-Sep-17	LILC3-BT-01	25.5	24.2	146	M	YM	3	21	-	-	58	none
	RG_LILC3	2017	659892	5531560		8-Sep-17	LILC3-BT-02	27.9	26.6	210	M	YM	3	19	-	-	65	none
	RG_LILC3	2017	659892	5531560		8-Sep-17	LILC3-BT-03	27.8	26.1	199	M	YM	3	28	-	-	61	abrasion on back
	RG_LILC3	2017	659892	5531560		8-Sep-17	LILC3-BT-04	28.0	26.6	209	M	YM	3	20	-	-	63	none
	RG_LILC3	2017	659892	5531560		8-Sep-17	LILC3-BT-05	32.3	30.9	342	M	YM	4	27	-	-	100	none
AWTF Shutdown	RG_LILC3	2018	659880	5531582	2018 LCO LAEMP (Minnow 2019a)	30-Apr-18	LILC3-BT-01	45.9	44.1	800	M	YM	-	21	-	-	-	none
	RG_LILC3	2018	659880	5531582		2-May-18	LILC3-BT-02	44.0	42.0	939	M	YM	-	45	-	-	-	none
	RG_LILC3	2018	659880	5531582		2-May-18	LILC3-BT-03	26.6	25.5	155	U	J	-	37	-	-	-	none
	RG_LILC3	2018	659880	5531582		3-May-18	LILC3-BT-04	39.3	37.7	669	U	J	-	46	-	-	-	none
	Mid-Canyon	2018	656825	5529140		21-Aug-18	RG_LI8_BT-1-M_20180821	-	20.2	87	U	J	-	7.6	-	-	-	none
After AWTF/AOP Operations Stabilize	RG_LILC3	2019	659870	5531576	2019 LCO LAEMP	4-Sep-19	LILC3_BT-01	28.5	27.1	245	F	YF	-	14	-	-	-	none
	RG_LILC3	2019	659870	5531576		4-Sep-19	LILC3_BT-02	27.7	26.4	210	F	YF	-	16	-	-	-	none
	RG_LILC3	2019	659870	5531576		4-Sep-19	LILC3_BT-03	26.0	24.4	160	M	YM	-	6.4	-	-	-	none
	RG_LILC3	2019	659870	5531576		5-Sep-19	LILC3_BT-04	27.8	26.5	112	M	YM	-	11	-	-	-	none
	RG_LILC3	2019	659870	5531576		5-Sep-19	LILC3_BT-05	28.6	27.4	205	F	YF	-	7.2	-	-	-	none
	RG_LILC3	2019	659870	5531576		5-Sep-19	LILC3_BT-06	68.7	66.6	3,150	F	A	-	5.8	-	19	-	none
	RG_LILC3	2019	659870	5531576		5-Sep-19	LILC3_BT-07	26.9	25.5	164	M	YM	-	11	-	-	-	none
	RG_LILC3	2019	659870	5531576		5-Sep-19	LILC3_BT-08	25.7	24.3	142	M	YM	-	12	-	-	-	none
	RG_LILC3	2019	659870	5531576		5-Sep-19	LILC3_BT-09	59.2	57.0	1,900	M	A	-	4.9	-	-	-	none
	RG_LI8	2019	655378	5529048		6-Sep-19	LI8_BT-01	75.0	72.5	3,950	F	A	-	5.6	-	18	-	none
	RG_LI8	2019	655378	5529048		6-Sep-19	LI8_BT-02	65.5	63.3	2,460	M	A	-	4.5	-	-	-	none
	RG_LI8	2019	654671	5529013		7-Sep-19	LI8_BT-03	70.6	67.5	3,200	M	A	-	4.7	-	-	-	none
	RG_LI8	2019	654671	5529013		7-Sep-19	LI8_BT-04	72.2	69.3	3,350	F	A	-	4.5	-	15	-	none
	Upper Line Creek, u/s LC2	2022	661775	5537040	Incidental	22-Aug-22	LC_LCA13_BT-1-2022-08-22	-	38.6	674	F	A	-	5.2	-	17	-	none

Ovary selenium concentration exceeding the Level 1 site-specific benchmark for "other fish" of 18 mg/kg dw (Elk Valley Water Quality Plan; Teck 2014).

Ovary selenium concentration exceeding the US EPA Effect Concentration (EC10) of 56.2 mg/kg dw for Dolly Varden trout (USEPA 2016).

Notes: "-" = no data recorded; AWTF = Active Water Treatment Facility; LCO = Line Creek Operations; LAEMP = Local Aquatic Effects Monitoring Program; AOP = Advanced Oxidation Process; u/s = upstream.

[a] F = female; M = male; U = unknown (sex of fish could not be determined, either because fish was not sufficiently mature or samples were collected non-lethally and sex could not be determined based on non-lethal evaluation of physical characteristics).

[b] A = adult; J = juvenile; YM = young male; YF = young female.

[c] Ovary concentrations were estimated from muscle selenium concentrations based on the average ovary-to-muscle concentration relationship of 3.3:1 (Minnow 2018d). Ovary selenium was estimated only for adult individuals lacking measured ovary concentrations (if female) or if sex of an adult individual was unknown.

[d] DELT = Deformities, erosions, lesions, tumors. DELT observations were initiated in 2017 following the start of AWTF operation.

Table D.13: Mean and Predicted Westslope Cutthroat Trout Ovary Selenium Tissue Concentrations, LCO LAEMP 2001 to 2022

Area	Date	Ovary Tissue Selenium (mg/kg dw)	Prediction Interval (mg/kg dw)		
			Lower (2.5%)	Mean	Upper (97.5%)
RG_LILC3	Jun-12	13.3	5.24	11.0	23.1
	Sep-17	42.4	5.26	11.1	23.3
	Sep-19	12.6	5.24	11.0	23.1
RG_LIDSL	Apr-17	40.2	5.23	11.0	23.1
	Sep-17	54.4	5.23	11.0	23.1
	Aug-18	17.6	5.32	11.2	23.6
	Sep-21	18.4	5.24	11.0	23.1
	Sep-22	13.2	5.24	11.0	23.1
RG_LIDCOM	Sep-18	40.0	5.33	11.2	23.7
	Sep-19	16.8	5.24	11.0	23.1
RG_LI8	Apr-02	15.3	5.25	11.0	23.0
	Apr-06	14.0	5.24	11.0	23.2
	Sep-09	19.4	5.24	11.0	23.1
	Sep-17	12.4	5.24	11.0	23.1
	Aug-18	14.1	5.23	11.0	23.1
	Sep-18	15.2	5.30	11.2	23.5
	Sep-19	16.4	5.24	11.0	23.1
RG_FO23	May-09	15.6	5.24	11.0	23.1
	May-12	13.2	5.24	11.0	23.1
	Sep-18	13.8	5.25	11.0	23.2
	Sep-21	13.9	5.23	11.0	23.1

Mean Concentration exceeds upper predicted limit.

Mean Concentration is below lower predicted limit.

Notes: WCT ovary tissue selenium concentrations for seven individual replicates are not shown as concurrent water samples were not available. mg/kg dw = milligrams per kilogram dry weight. Mean egg and ovary selenium concentrations (solid black line) were estimated using a two−step water to fish egg selenium accumulation model: step 1 − log10[Se]benthic invertebrate = 0.717 0.072 x log10[Se]aq and step 2 − log10[Se]fish = 1.02 + 0.026 x log10[Se]inv when [Se]inv < 6.8 and log10[Se]fish = 1.26 + 1.10 x log10[Se]inv when [Se]inv >= 6.8 (Golder 2018).

Table D.14: Concentrations of Selenium Species Measured at Biological Monitoring Stations from LCO, May to December, LAEMP, 2022

Water Body		Biological Monitoring Area	Sample Date	Selenate (µg/L)	Selenite (µg/L)	Dimethylselenoxide (µg/L)	Methylseleninic Acid (µg/L)	Methaneselenonic Acid (µg/L)	Selenocyanate (µg/L)	Selenomethionine (µg/L)	Selenosulphate (µg/L)	Unknown Species (µg/L)	Sum of Species (µg/L)	Organoselenium (µg/L)[a]
Reference	South Line Creek	RG_SLINE	3-May-2022	1.03	0.031	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.1	<0.01
			12-Jul-2022	0.64	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.6	<0.01
			16-Sep-2022	1.43	0.021	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.5	<0.01
			30-Nov-2022	1.51	0.026	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.5	<0.01
	Line Creek	RG_LI24	3-May-2022	1.40	0.024	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.4	<0.01
			11-Jul-2022	1.70	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.7	<0.01
			17-Sep-2022	2.80	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.8	<0.01
			30-Nov-2022	2.87	0.025	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.9	<0.01
Mine-Exposed		RG_LCUT	2-May-2022	55.00	0.065	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	55.1	<0.01
			12-Jul-2022	21.90	0.069	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	22.0	<0.01
			15-Sep-2022	63.00	0.083	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	63.1	<0.01
			1-Dec-2022	51.60	0.087	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	51.7	<0.01
		RG_LILC3	2-May-2022	57.10	0.263	<0.01	0.015	0.046	<0.01	<0.01	<0.01	<0.01	57.4	0.015
			12-Jul-2022	30.50	0.068	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	30.6	<0.01
			8-Sep-2022	43.40	0.122	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	43.5	<0.01
			1-Dec-2022	46.80	0.249	<0.01	<0.01	0.033	<0.01	<0.01	<0.01	<0.01	47.1	<0.01
		RG_LISP24	3-May-2022	37.70	0.178	<0.01	0.013	0.028	<0.01	<0.01	<0.01	<0.01	37.9	0.013
			13-Jul-2022	23.20	0.054	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	23.3	<0.01
			14-Sep-2022	38.40	0.130	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	38.5	<0.01
			1-Dec-2022	28.70	0.193	<0.01	<0.01	0.016	<0.01	<0.01	<0.01	<0.01	28.9	<0.01
		RG_LIDSL	4-May-2022	41.20	0.16	<0.01	0.01	0.02	<0.01	<0.01	<0.01	<0.01	41.4	0.011
			11-Jul-2022	21.50	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	21.6	<0.01
			13-Sep-2022	37.40	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	37.5	<0.01
			29-Nov-2022	39.60	0.181	<0.01	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	39.8	<0.01
		RG_LIDCOM	4-May-2022	30.20	0.136	<0.01	<0.01	0.013	<0.01	<0.01	<0.01	<0.01	30.3	<0.01
			14-Jul-2022	21.70	0.052	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	21.8	<0.01
			12-Sep-2022	34.40	0.120	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	34.5	<0.01
			1-Dec-2022	33.70	0.149	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	33.9	0.012
		RG_LI8	4-May-2022	27.50	0.106	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.6	<0.01
			14-Jul-2022	20.00	0.048	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	20.0	<0.01
			17-Sep-2022	31.80	0.087	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	31.9	<0.01
			2-Dec-2022	27.80	0.024	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.8	<0.01
	Fording River	RG_FRUL	4-May-2022	39.70	0.228	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	39.9	<0.01
			13-Jul-2022	20.70	0.100	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	20.8	<0.01
			10-Sep-2022	40.10	0.248	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	40.4	0.014
			29-Nov-2022	45.70	0.152	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	45.9	<0.01
		RG_FO23	4-May-2022	41.40	0.214	<0.01	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	41.6	0.015
			11-Jul-2022	19.50	0.100	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	19.6	0.011
			9-Sep-2022	36.50	0.197	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	36.7	0.011
			2-Dec-2022	40.20	0.124	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.3	<0.01

Level 2: Sum of MeSe(IV) and DMSeO ≥ 0.025 µg/L
Level 3: Sum of MeSe(IV) and DMSeO > 0.050 µg/L

Note: [a] For the calculation of organoselenium, if both dimethylselenoxide and methylseleninic acid were non-detect values the result is reported as <0.01

Table D.15: Concentrations of Selenium Species Measured in Water Samples from Line Creek and Fording River, 2022

Waterbody		Teck Water Station Code	Biological Monitoring Area	Sample Date	Selenate (µg/L)	Selenite (µg/L)	Dimethylselenoxide (µg/L)	Methylseleninic Acid (µg/L)	Selenocyanate (µg/L)	Selenomethionine (µg/L)	Selenosulphate (µg/L)	Methaneselenonic Acid (µg/L)	Unknown Species (µg/L)	Sum of Species (µg/L)	Organoselenium (µg/L)[a]
Reference	Line Creek	LC_LC1	RG_LI24	25-Jan-22	2.67	0.031	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.70	<0.01
				5-Apr-22	1.83	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.88	<0.01
				18-Apr-22	2.11	0.019	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.13	<0.01
				3-May-22	1.4	0.024	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.42	<0.01
				5-Jul-22	1.25	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.27	<0.01
				11-Jul-22	1.7	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.72	<0.01
				3-Aug-22	2.77	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.79	<0.01
				12-Sep-22	2.51	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.53	<0.01
				17-Sep-22	2.8	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.82	<0.01
				3-Oct-22	2.41	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.43	<0.01
				30-Nov-22	2.87	0.025	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.90	<0.01
		LC_SLC	RG_SLINE	6-Jan-22	1.33	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.35	<0.01
				14-Feb-22	1.48	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.49	<0.01
				5-Apr-22	1.38	0.031	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.41	<0.01
				3-May-22	1.03	0.031	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.06	<0.01
				8-Jul-22	0.494	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.51	<0.01
				12-Jul-22	0.636	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.66	<0.01
				16-Aug-22	0.991	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.01	<0.01
				16-Sep-22	1.43	0.021	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.45	<0.01
				11-Oct-22	1.5	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.53	<0.01
				18-Oct-22	1.36	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.38	<0.01
				25-Oct-22	1.56	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.58	<0.01
				30-Nov-22	1.51	0.026	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.54	<0.01
Mine-exposed	Line Creek	LC_WLC	RG_LCUT	27-Jun-22	137	0.138	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	137.14	<0.01
				26-Sep-22	360	0.094	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	360.09	<0.01
				12-Dec-22	413	0.128	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	413.13	<0.01
		LC_LCUSWLC		4-Jan-22	35.6	0.043	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	35.64	<0.01
				10-Jan-22	69.1	0.075	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	69.18	<0.01
				17-Jan-22	66.6	0.085	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	66.69	<0.01
				21-Jan-22	47.2	0.066	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	47.27	<0.01
				25-Jan-22	70.8	0.091	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	70.89	<0.01
				2-Feb-22	70.1	0.068	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	70.17	<0.01
				7-Feb-22	71	0.093	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	71.09	<0.01
				14-Feb-22	74.6	0.088	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	74.69	<0.01
				23-Feb-22	71.7	0.089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	71.79	<0.01
				28-Feb-22	73.3	0.096	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	73.40	<0.01
				7-Mar-22	74.6	0.091	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	74.69	<0.01
				14-Mar-22	71.1	0.087	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	71.19	<0.01
				21-Mar-22	71.7	0.068	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	71.77	<0.01
				29-Mar-22	71.25	0.0855	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	71.34	<0.01
				11-Apr-22	62.7	0.096	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	62.80	<0.01
				20-Apr-22	60.9	0.074	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	60.97	<0.01
				27-Apr-22	61.9	0.072	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	61.97	<0.01
				2-May-22	55	0.065	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	55.07	<0.01
				4-May-22	54.3	0.072	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	54.37	<0.01
				10-May-22	39.8	0.073	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	39.87	<0.01
				18-May-22	40.4	0.066	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.47	<0.01
				25-May-22	37.1	0.071	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	37.17	<0.01
				1-Jun-22	25.8	0.066	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	25.87	<0.01
				8-Jun-22	19.9	0.149	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	20.05	<0.01
				16-Jun-22	17.6	0.134	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	17.73	<0.01
				22-Jun-22	24.3	0.134	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	24.43	<0.01
				27-Jun-22	19.7	0.17	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	19.87	<0.01
				29-Jun-22	16.7	0.123	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	16.82	<0.01
				6-Jul-22	16.9	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	16.98	<0.01
				12-Jul-22	21.9	0.069	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	21.97	<0.01
				13-Jul-22	26.4	0.083	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	26.48	<0.01
				20-Jul-22	38.6	0.095	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	38.70	<0.01
				27-Jul-22	36	0.067	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	36.07	<0.01
				3-Aug-22	49.2	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	49.28	<0.01
				10-Aug-22	44.9	0.068	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	44.97	<0.01
				17-Aug-22	49.1	0.077	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	49.18	<0.01
				24-Aug-22	51.3	0.065	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	51.37	<0.01
				31-Aug-22	40.5	0.061	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.56	<0.01
				7-Sep-22	42.4	0.061	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	42.46	<0.01
				14-Sep-22	50.6	0.061	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	50.66	<0.01
				15-Sep-22	63	0.083	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	63.08	<0.01
				21-Sep-22	54	0.066	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	54.07	<0.01
				26-Sep-22	56.3	0.058	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	56.36	<0.01
				28-Sep-22	53.7	0.077	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	53.78	<0.01
				5-Oct-22	42.8	0.074	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	42.87	<0.01
				12-Oct-22	49.9	0.075	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	49.98	<0.01
				19-Oct-22	44.9	0.064	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	44.96	<0.01
				26-Oct-22	50.4	0.075	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	50.48	<0.01
				2-Nov-22	35.9	0.054	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	35.95	<0.01
				9-Nov-22	40.6	0.062	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.66	<0.01
				16-Nov-22	48.2	0.045	<0.01	<0.01	0.08	<0.01	<0.01	<0.01	<0.01	48.33	<0.01
				23-Nov-22	49.3	0.077	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	49.38	<0.01
				30-Nov-22	42.3	0.072	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	42.37	<0.01
				1-Dec-22	51.6	0.087	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	51.69	<0.01
				6-Dec-22	48	0.078	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	48.08	<0.01
				12-Dec-22	54.1	0.076	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	54.18	<0.01
				14-Dec-22	46.6	0.092	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	46.69	<0.01
				21-Dec-22	54.3	0.104	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	54.40	<0.01
				28-Dec-22	53.1	0.111	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	53.21	<0.01

Level 2: Sum of MeSe(IV) and DMSeO ≥ 0.025 µg/L

Level 3: Sum of MeSe(IV) and DMSeO > 0.050 µg/L

Notes: [a] For the calculation of organoselenium, if both dimethylselenoxide and methylseleninic acid were non-detect values the result is reported as <0.01

Table D.15: Concentrations of Selenium Species Measured in Water Samples from Line Creek and Fording River, 2022

Waterbody		Teck Water Station Code	Biological Monitoring Area	Sample Date	Selenate (µg/L)	Selenite (µg/L)	Dimethylselenoxide (µg/L)	Methylseleninic Acid (µg/L)	Selenocyanate (µg/L)	Selenomethionine (µg/L)	Selenosulphate (µg/L)	Methaneselenonic Acid (µg/L)	Unknown Species (µg/L)	Sum of Species (µg/L)	Organoselenium (µg/L)[a]
Mine-exposed	Line Creek	LC_LC3	RG_LILC3	4-Jan-22	47.8	0.327	0.018	<0.01	<0.01	<0.01	<0.01	0.104	<0.01	48.27	0.018
				10-Jan-22	49.5	0.363	0.013	<0.01	<0.01	<0.01	<0.01	0.11	<0.01	50.00	0.013
				17-Jan-22	46.5	0.348	0.019	<0.01	<0.01	<0.01	<0.01	0.108	<0.01	46.99	0.019
				25-Jan-22	47.3	0.376	<0.01	<0.01	<0.01	<0.01	<0.01	0.107	<0.01	47.78	<0.01
				1-Feb-22	48.7	0.36	0.026	<0.01	<0.01	<0.01	<0.01	0.155	<0.01	49.27	0.026
				8-Feb-22	49.2	0.469	0.028	<0.01	<0.01	<0.01	<0.01	0.113	<0.01	49.84	0.028
				15-Feb-22	59.4	0.43	0.021	<0.01	<0.01	<0.01	<0.01	0.098	<0.01	59.97	0.021
				22-Feb-22	54.3	0.644	0.029	0.011	<0.01	<0.01	<0.01	0.121	<0.01	55.15	0.040
				23-Feb-22	34.1	0.051	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	34.15	<0.01
				1-Mar-22	50.6	0.62	0.029	<0.01	<0.01	<0.01	<0.01	0.141	<0.01	51.42	0.029
				8-Mar-22	52.7	0.739	0.035	<0.01	<0.01	<0.01	<0.01	0.188	<0.01	53.70	0.035
				15-Mar-22	45.7	0.914	0.054	<0.01	<0.01	<0.01	<0.01	0.26	<0.01	46.98	0.054
				22-Mar-22	54.9	0.61	0.043	<0.01	<0.01	<0.01	<0.01	<0.01	0.199	55.80	0.043
				28-Mar-22	62.6	0.746	0.051	0.014	<0.01	<0.01	<0.01	0.228	<0.01	63.70	0.065
				7-Apr-22	55.2	0.6	0.04	0.013	<0.01	<0.01	<0.01	0.193	<0.01	56.10	0.053
				11-Apr-22	54.2	0.384	0.031	<0.01	<0.01	<0.01	<0.01	0.102	<0.01	54.75	0.031
				19-Apr-22	57	0.338	0.021	<0.01	<0.01	<0.01	<0.01	0.094	<0.01	57.47	0.021
				25-Apr-22	53.4	0.407	0.023	<0.01	<0.01	<0.01	<0.01	0.114	<0.01	53.97	0.023
				2-May-22	57.1	0.263	<0.01	0.015	<0.01	<0.01	<0.01	0.046	<0.01	57.44	0.015
				5-May-22	56	0.266	0.011	<0.01	<0.01	<0.01	<0.01	0.062	<0.01	56.35	0.011
				9-May-22	42.5	0.19	<0.01	<0.01	<0.01	<0.01	<0.01	0.029	<0.01	42.72	<0.01
				17-May-22	45.5	0.213	<0.01	<0.01	<0.01	<0.01	<0.01	0.032	<0.01	45.75	<0.01
				24-May-22	36.6	0.1295	<0.01	<0.01	<0.01	<0.01	<0.01	0.015	<0.01	36.74	<0.01
				6-Jun-22	43	0.099	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	43.10	<0.01
				14-Jun-22	28.2	0.131	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	28.33	<0.01
				22-Jun-22	35.1	0.134	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	35.23	<0.01
				27-Jun-22	25.7	0.139	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	25.84	<0.01
				5-Jul-22	27.7	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.78	<0.01
				11-Jul-22	27.8	0.088	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.89	<0.01
				12-Jul-22	30.5	0.068	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	30.57	<0.01
				19-Jul-22	54.3	0.142	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	54.44	<0.01
				26-Jul-22	51.9	0.078	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	51.98	<0.01
				3-Aug-22	54.4	0.128	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	54.53	<0.01
				8-Aug-22	51.6	0.162	<0.01	<0.01	<0.01	<0.01	<0.01	0.012	<0.01	51.77	<0.01
				16-Aug-22	48.6	0.237	<0.01	0.017	<0.01	<0.01	<0.01	0.057	<0.01	48.93	0.017
				17-Aug-22	45.9	0.361	<0.01	0.016	<0.01	<0.01	<0.01	0.106	<0.01	46.40	0.016
				23-Aug-22	49.9	0.225	<0.01	0.013	<0.01	<0.01	<0.01	0.029	<0.01	50.18	0.013
				30-Aug-22	64.8	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	64.91	<0.01
				6-Sep-22	42.3	0.126	<0.01	<0.01	<0.01	<0.01	<0.01	0.032	<0.01	42.46	<0.01
				8-Sep-22	43.4	0.122	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	43.52	<0.01
				13-Sep-22	48.4	0.202	<0.01	0.013	<0.01	<0.01	<0.01	0.031	<0.01	48.66	0.013
				19-Sep-22	43.2	0.164	<0.01	<0.01	<0.01	<0.01	<0.01	0.028	<0.01	43.39	<0.01
				29-Sep-22	41.9	0.174	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	42.10	<0.01
				3-Oct-22	41.4	0.161	<0.01	<0.01	<0.01	<0.01	<0.01	0.021	<0.01	41.58	<0.01
				11-Oct-22	52.7	0.171	<0.01	<0.01	<0.01	<0.01	<0.01	0.017	<0.01	52.89	<0.01
				18-Oct-22	40.9	0.149	<0.01	<0.01	<0.01	<0.01	<0.01	0.026	<0.01	41.08	<0.01
				25-Oct-22	45.9	0.213	<0.01	<0.01	<0.01	<0.01	<0.01	0.042	<0.01	46.16	<0.01
				1-Nov-22	27	0.317	<0.01	0.013	<0.01	<0.01	<0.01	0.111	<0.01	27.45	0.013
				8-Nov-22	39.1	0.284	<0.01	<0.01	<0.01	<0.01	<0.01	0.085	<0.01	39.47	<0.01
				14-Nov-22	39.2	0.22	<0.01	<0.01	<0.01	<0.01	<0.01	0.039	<0.01	39.46	<0.01
				21-Nov-22	62.2	0.193	<0.01	<0.01	0.079	<0.01	<0.01	<0.01	0.037	62.51	<0.01
				28-Nov-22	45.6	0.227	<0.01	<0.01	<0.01	<0.01	<0.01	0.056	<0.01	45.88	<0.01
				1-Dec-22	46.8	0.249	<0.01	<0.01	<0.01	<0.01	<0.01	0.033	<0.01	47.08	<0.01
				5-Dec-22	28.9	0.19	<0.01	<0.01	<0.01	<0.01	<0.01	0.038	<0.01	29.13	<0.01
				12-Dec-22	42.9	0.281	<0.01	0.018	<0.01	<0.01	<0.01	0.044	<0.01	43.26	0.018
				19-Dec-22	47	0.276	<0.01	<0.01	<0.01	<0.01	<0.01	0.049	0.018	47.34	<0.01
				28-Dec-22	46.8	0.571	<0.01	<0.01	<0.01	<0.01	<0.01	0.166	<0.01	47.54	<0.01
		WL_DCP_SP24	RG_LISP24	3-May-22	37.7	0.178	<0.01	0.013	<0.01	<0.01	<0.01	0.028	<0.01	37.93	0.013
				13-Jul-22	23.2	0.054	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	23.25	<0.01
				14-Sep-22	38.4	0.13	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	38.53	<0.01
				1-Dec-22	28.7	0.193	<0.01	<0.01	<0.01	<0.01	<0.01	0.016	<0.01	28.91	<0.01
		LC_LCDSSLCC	RG_LIDSL	4-Jan-22	27.6	0.127	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.73	<0.01
				10-Jan-22	42.2	0.225	<0.01	0.011	<0.01	<0.01	<0.01	0.025	<0.01	42.47	0.011
				17-Jan-22	39.5	0.233	<0.01	<0.01	<0.01	<0.01	<0.01	0.021	<0.01	39.75	<0.01
				25-Jan-22	40.8	0.229	<0.01	0.013	<0.01	<0.01	<0.01	0.018	<0.01	41.07	0.013
				1-Feb-22	41.3	0.199	<0.01	0.012	<0.01	<0.01	<0.01	0.034	<0.01	41.56	0.012
				8-Feb-22	41.1	0.238	<0.01	0.012	<0.01	<0.01	<0.01	0.022	<0.01	41.38	0.012
				15-Feb-22	45.1	0.264	<0.01	0.012	<0.01	<0.01	<0.01	0.022	<0.01	45.41	0.012
				22-Feb-22	50.7	0.298	0.012	0.015	<0.01	<0.01	<0.01	0.028	<0.01	51.08	0.027
				1-Mar-22	43.1	0.272	0.012	0.015	<0.01	<0.01	<0.01	0.024	<0.01	43.45	0.027
				8-Mar-22	44.4	0.374	0.011	0.015	<0.01	<0.01	<0.01	0.037	<0.01	44.86	0.026
				15-Mar-22	43.5	0.415	0.018	0.023	<0.01	<0.01	<0.01	0.06	<0.01	44.06	0.041
				22-Mar-22	30.5	0.255	<0.01	<0.01	<0.01	<0.01	<0.01	0.027	<0.01	30.78	0.000
				28-Mar-22	51.4	0.405	0.02	0.02	<0.01	<0.01	<0.01	0.064	<0.01	51.95	0.040
				7-Apr-22	50.1	0.356	0.016	0.019	<0.01	<0.01	<0.01	0.06	<0.01	50.59	0.035
				11-Apr-22	47.4	0.269	0.016	0.02	<0.01	<0.01	<0.01	0.029	<0.01	47.77	0.036
				19-Apr-22	49.6	0.228	0.012	0.014	<0.01	<0.01	<0.01	0.03	<0.01	49.91	0.026
				25-Apr-22	45.7	0.227	<0.01	0.015	<0.01	<0.01	<0.01	0.028	<0.01	45.99	0.015
				4-May-22	41.2	0.155	<0.01	0.011	<0.01	<0.01	<0.01	0.018	<0.01	41.40	0.011
				9-May-22	30.8	0.112	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	30.91	<0.01
				17-May-22	27.5	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.60	<0.01
				24-May-22	20.55	0.073	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	20.62	<0.01
				6-Jun-22	22.2	0.051	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	22.25	<0.01
				22-Jun-22	20.4	0.076	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	20.48	<0.01
				27-Jun-22	19.2	0.085	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	19.29	<0.01

Level 2: Sum of MeSe(IV) and DMSeO ≥ 0.025 µg/L

Level 3: Sum of MeSe(IV) and DMSeO > 0.050 µg/L

Notes: [a] For the calculation of organoselenium, if both dimethylselenoxide and methylseleninic acid were non-detect values the result is reported as <0.01

Table D.15: Concentrations of Selenium Species Measured in Water Samples from Line Creek and Fording River, 2022

Waterbody		Teck Water Station Code	Biological Monitoring Area	Sample Date	Selenate (µg/L)	Selenite (µg/L)	Dimethylselenoxide (µg/L)	Methylseleninic Acid (µg/L)	Selenocyanate (µg/L)	Selenomethionine (µg/L)	Selenosulphate (µg/L)	Methaneselenonic Acid (µg/L)	Unknown Species (µg/L)	Sum of Species (µg/L)	Organoselenium (µg/L)[a]
Mine-exposed	Line Creek	LC_LCDSSLCC	RG_LIDSL	5-Jul-22	18.3	0.053	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	18.35	<0.01
				11-Jul-22	21.5	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	21.56	<0.01
				19-Jul-22	36.3	0.088	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	36.39	<0.01
				26-Jul-22	33.5	0.056	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	33.56	<0.01
				3-Aug-22	40.5	0.102	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.60	<0.01
				9-Aug-22	34.6	0.093	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	34.69	<0.01
				16-Aug-22	37.6	0.144	<0.01	<0.01	<0.01	<0.01	<0.01	0.016	<0.01	37.76	<0.01
				22-Aug-22	36.9	0.141	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	37.04	<0.01
				30-Aug-22	43.3	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	43.39	<0.01
				6-Sep-22	33.5	0.097	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	33.62	0.012
				12-Sep-22	7.95	0.066	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8.02	<0.01
				13-Sep-22	37.4	0.123	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	37.52	<0.01
				19-Sep-22	37.7	0.133	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	37.83	<0.01
				3-Oct-22	36	0.111	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	36.11	<0.01
				11-Oct-22	40.1	0.159	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.26	<0.01
				18-Oct-22	37.3	0.135	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	37.44	<0.01
				25-Oct-22	40	0.143	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.14	<0.01
				1-Nov-22	31.4	0.249	<0.01	0.018	<0.01	<0.01	<0.01	0.039	<0.01	31.72	0.018
				8-Nov-22	34.4	0.206	<0.01	0.014	<0.01	<0.01	<0.01	0.017	<0.01	34.65	0.014
				14-Nov-22	35.1	0.152	<0.01	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	35.26	<0.01
				21-Nov-22	36.1	0.144	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	36.24	<0.01
				28-Nov-22	39.9	0.174	<0.01	0.012	<0.01	<0.01	<0.01	0.011	<0.01	40.11	0.012
				29-Nov-22	39.6	0.181	<0.01	<0.01	<0.01	<0.01	<0.01	0.014	<0.01	39.80	<0.01
				5-Dec-22	30	0.166	<0.01	0.012	<0.01	<0.01	<0.01	0.012	<0.01	30.20	0.012
				12-Dec-22	38.2	0.179	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	38.38	<0.01
				19-Dec-22	41.4	0.222	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.023	41.65	<0.01
				28-Dec-22	43.1	0.304	<0.01	0.015	<0.01	<0.01	<0.01	0.037	<0.01	43.47	0.015
		LC_LCC	RG_LIDCOM	4-May-22	30.2	0.136	<0.01	<0.01	<0.01	<0.01	<0.01	0.013	<0.01	30.35	<0.01
				14-Jul-22	21.7	0.052	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	21.75	<0.01
				12-Sep-22	34.4	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	34.52	<0.01
				1-Dec-22	33.7	0.149	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	33.87	0.012
		LC_LC4	RG_LI8	4-Jan-22	22.7	0.037	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	22.74	<0.01
				10-Jan-22	32.8	0.059	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	32.86	<0.01
				17-Jan-22	30.3	0.066	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	30.37	<0.01
				25-Jan-22	31.2	0.062	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	31.26	<0.01
				31-Jan-22	31.8	0.087	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	31.89	<0.01
				8-Feb-22	31.7	0.057	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	31.76	<0.01
				14-Feb-22	32.7	0.172	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	32.87	<0.01
				1-Mar-22	32.6	0.065	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	32.67	<0.01
				8-Mar-22	33.8	0.067	<0.01	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	33.88	<0.01
				14-Mar-22	33	0.155	<0.01	<0.01	<0.01	<0.01	<0.01	0.017	<0.01	33.17	<0.01
				22-Mar-22	34.3	0.075	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.014	34.39	<0.01
				29-Mar-22	40.3	0.124	<0.01	<0.01	<0.01	<0.01	0.035	0.028	<0.01	40.49	<0.01
				7-Apr-22	40	0.247	<0.01	0.011	<0.01	<0.01	<0.01	0.024	<0.01	40.29	0.011
				11-Apr-22	38.9	0.18	<0.01	0.013	<0.01	<0.01	0.017	0.014	<0.01	39.14	0.013
				19-Apr-22	37.7	0.08	<0.01	<0.01	0.016	<0.01	<0.01	0.012	<0.01	37.81	<0.01
				25-Apr-22	33.8	0.101	<0.01	<0.01	<0.01	<0.01	<0.01	0.013	<0.01	33.91	<0.01
				4-May-22	27.5	0.106	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.61	<0.01
				5-May-22	29.8	0.073	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	29.87	<0.01
				9-May-22	25.3	0.091	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	25.39	<0.01
				17-May-22	21	0.079	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	21.08	<0.01
				24-May-22	20.5	0.072	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.025	20.60	<0.01
				30-May-22	17.4	0.064	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	17.46	<0.01
				6-Jun-22	17.5	0.048	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	17.55	<0.01
				13-Jun-22	13.9	0.101	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	14.00	<0.01
				22-Jun-22	16.9	0.066	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	16.97	<0.01
				27-Jun-22	16.1	0.073	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	16.17	<0.01
				5-Jul-22	15.4	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	15.45	<0.01
				11-Jul-22	18.2	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	18.25	<0.01
				14-Jul-22	20	0.048	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	20.05	<0.01
				19-Jul-22	27.8	0.054	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.85	<0.01
				26-Jul-22	27.5	0.032	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.53	<0.01
				2-Aug-22	33.6	0.055	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	33.66	<0.01
				8-Aug-22	33.3	0.061	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	33.36	<0.01
				15-Aug-22	29.2	0.089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	29.29	<0.01
				22-Aug-22	30	0.064	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	30.06	<0.01
				29-Aug-22	36.3	0.041	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	36.34	<0.01
				6-Sep-22	27.5	0.058	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.56	<0.01
				13-Sep-22	30	0.061	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	30.06	<0.01
				17-Sep-22	31.8	0.087	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	31.89	<0.01
				19-Sep-22	31.3	0.052	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	31.35	<0.01
				29-Sep-22	36.4	0.121	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	36.52	<0.01
				3-Oct-22	29.4	0.028	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	29.43	<0.01
				17-Oct-22	32.1	0.033	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	32.13	<0.01
				24-Oct-22	30	0.037	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	30.04	<0.01
				31-Oct-22	30.1	0.183	<0.01	<0.01	<0.01	<0.01	<0.01	0.027	<0.01	30.31	<0.01
				7-Nov-22	25.3	0.061	<0.01	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	25.37	<0.01
				14-Nov-22	27.6	0.037	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.64	<0.01
				21-Nov-22	32.7	0.044	<0.01	<0.01	0.055	<0.01	<0.01	<0.01	<0.01	32.80	<0.01
				28-Nov-22	31.4	0.066	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	31.47	<0.01
				2-Dec-22	27.8	0.024	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.82	<0.01
				5-Dec-22	22.3	0.035	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	22.34	<0.01
				12-Dec-22	30.2	0.041	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	30.24	<0.01
				19-Dec-22	31.1	0.094	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	31.19	<0.01
				28-Dec-22	32.8	0.22	<0.01	0.014	<0.01	<0.01	<0.01	0.015	<0.01	33.06	0.014

Level 2: Sum of MeSe(IV) and DMSeO ≥ 0.025 µg/L

Level 3: Sum of MeSe(IV) and DMSeO > 0.050 µg/L

Notes: [a] For the calculation of organoselenium, if both dimethylselenoxide and methylseleninic acid were non-detect values the result is reported as <0.01

Table D.15: Concentrations of Selenium Species Measured in Water Samples from Line Creek and Fording River, 2022

Waterbody		Teck Water Station Code	Biological Monitoring Area	Sample Date	Selenate (µg/L)	Selenite (µg/L)	Dimethylselenoxide (µg/L)	Methylseleninic Acid (µg/L)	Selenocyanate (µg/L)	Selenomethionine (µg/L)	Selenosulphate (µg/L)	Methaneselenonic Acid (µg/L)	Unknown Species (µg/L)	Sum of Species (µg/L)	Organoselenium (µg/L)[a]
Mine-exposed	Fording River	LC_LC5	RG_FO23	6-Jan-22	40.3	0.138	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.44	<0.01
				5-Apr-22	46.4	0.258	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	46.68	0.011
				18-Apr-22	48.6	0.213	0.011	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	48.86	0.024
				4-May-22	41.4	0.214	<0.01	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	41.64	0.015
				5-Jul-22	19.9	0.102	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	20.00	<0.01
				11-Jul-22	19.5	0.1	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	19.62	0.011
				16-Aug-22	34.7	0.24	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	34.96	0.011
				6-Sep-22	35.1	0.229	<0.01	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	35.36	0.015
				9-Sep-22	36.5	0.197	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	36.72	0.011
				11-Oct-22	39.2	0.203	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	39.40	<0.01
				18-Oct-22	37.2	0.185	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	37.39	<0.01
				2-Dec-22	40.2	0.124	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.32	<0.01
		LC_LC6	RG_FRUL	2-May-22	39.7	0.228	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	39.93	<0.01
				4-May-22	39.7	0.228	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	39.93	<0.01
				13-Jul-22	20.7	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	20.80	<0.01
				10-Sep-22	40.1	0.248	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	40.38	0.014
				29-Nov-22	45.7	0.152	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	45.85	<0.01

Level 2: Sum of MeSe(IV) and DMSeO ≥ 0.025 µg/L

Level 3: Sum of MeSe(IV) and DMSeO > 0.050 µg/L

Notes: [a] For the calculation of organoselenium, if both dimethylselenoxide and methylseleninic acid were non-detect values the result is reported as <0.01

APPENDIX E
OTHER INFLUENCES

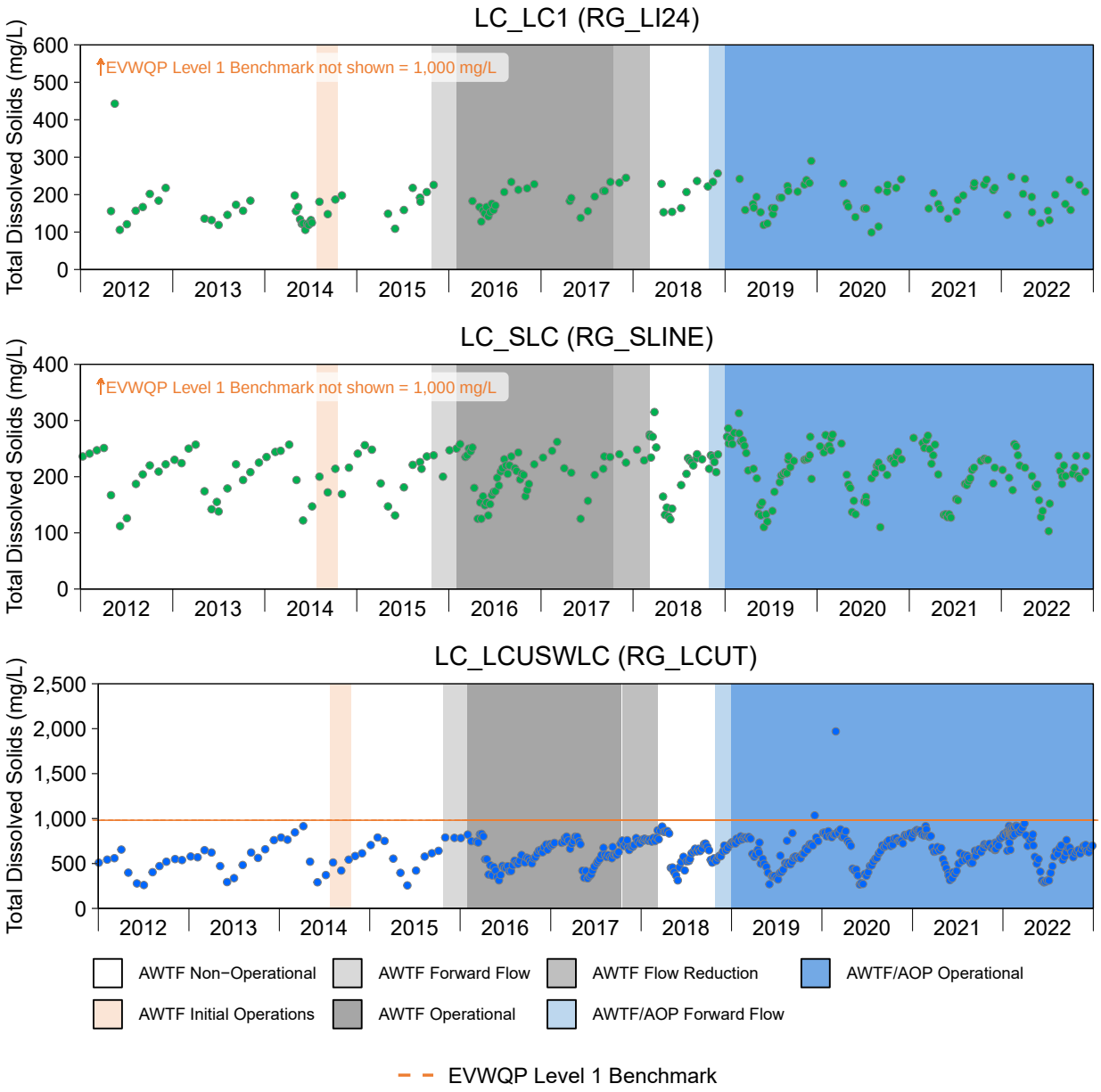


Figure E.1: Time Series Plots for Total Dissolved Solids Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

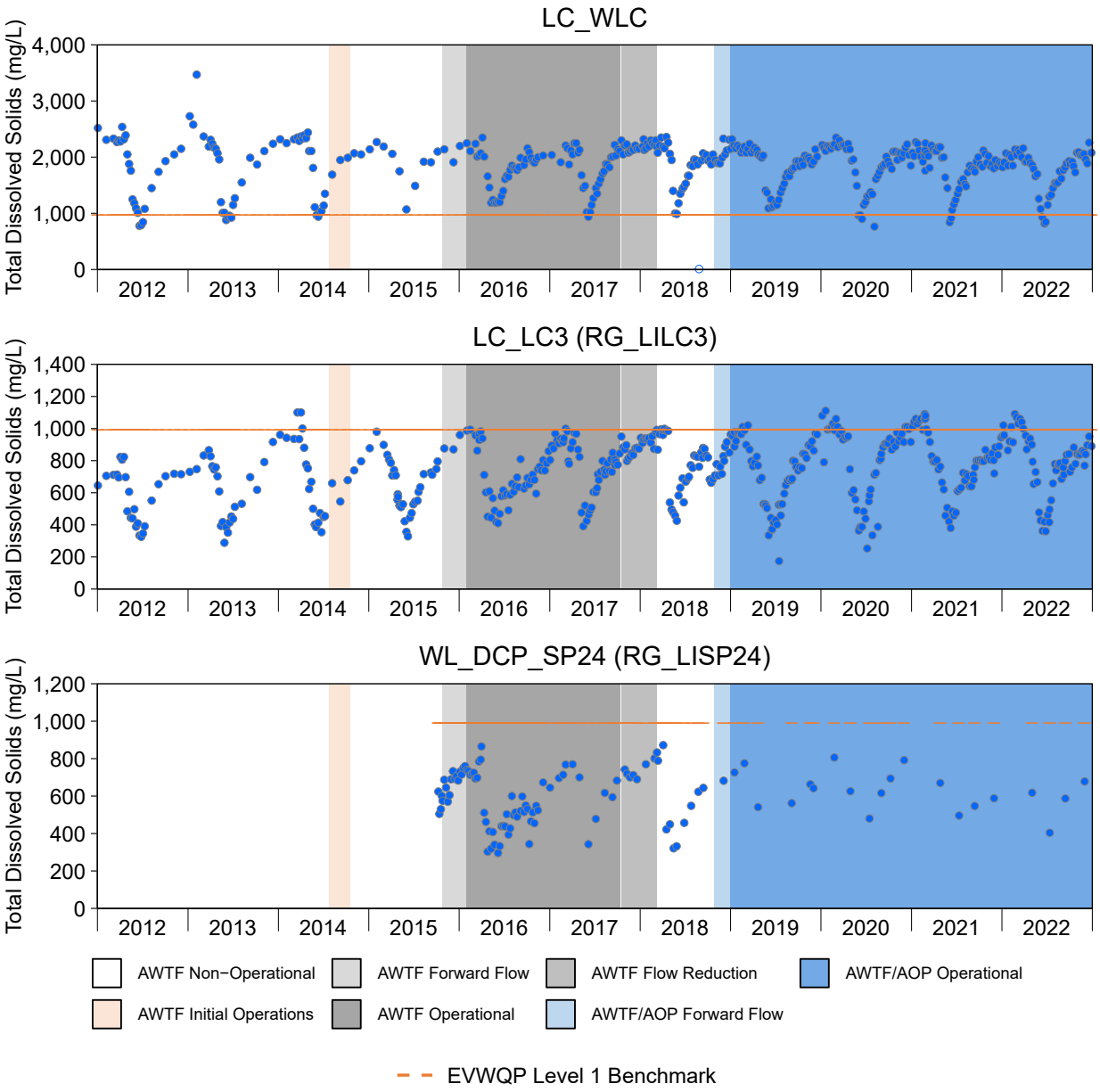


Figure E.1: Time Series Plots for Total Dissolved Solids Concentrations from LineCreek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

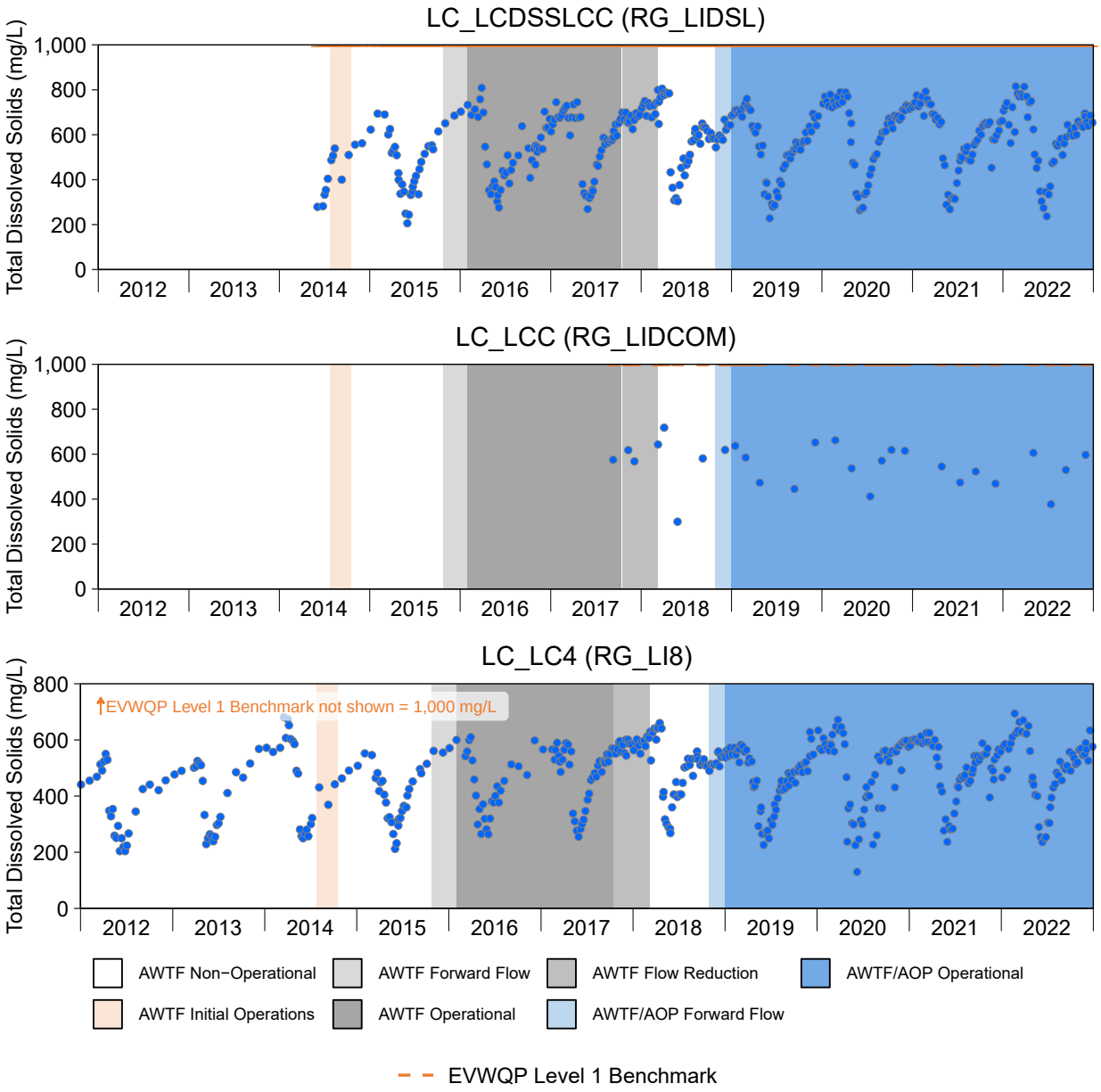


Figure E.1: Time Series Plots for Total Dissolved Solids Concentrations from LineCreek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

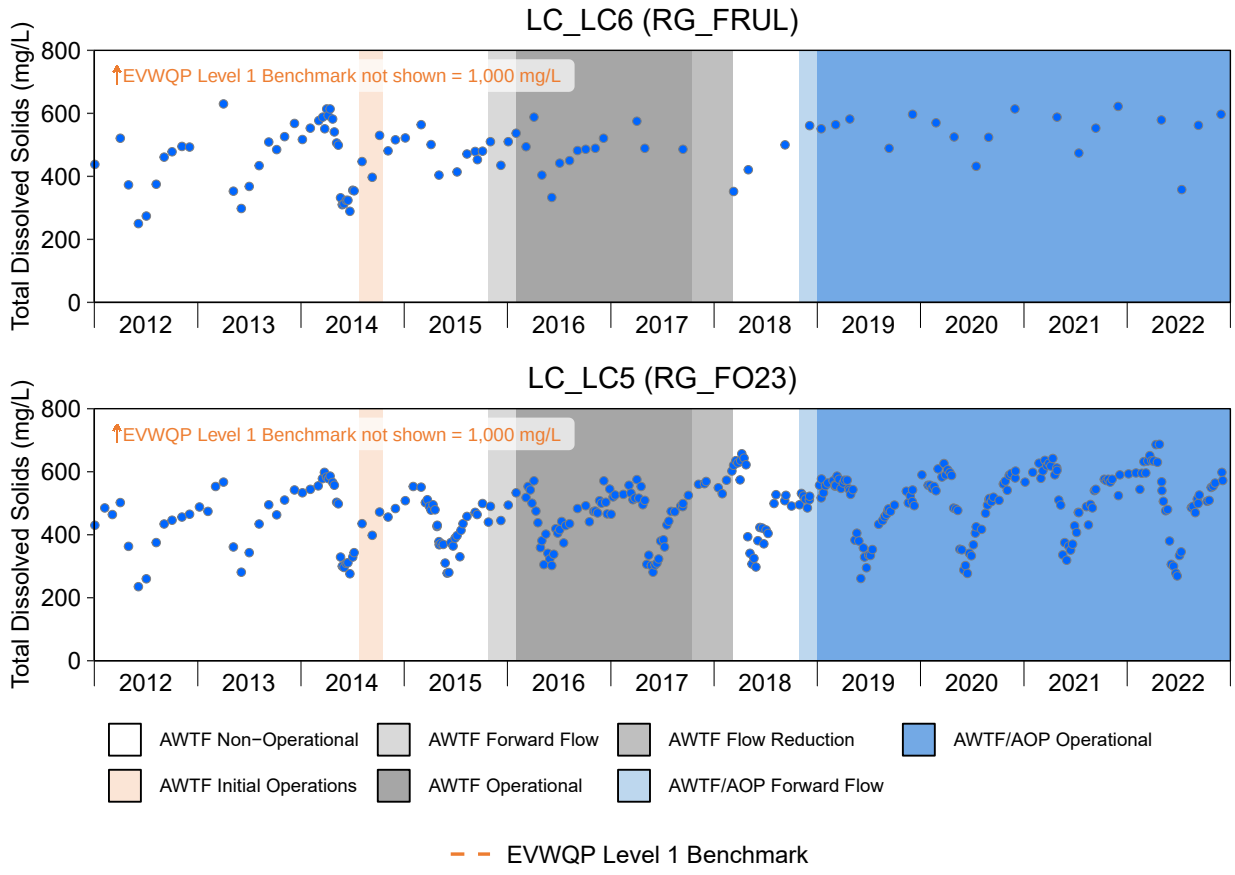


Figure E.1: Time Series Plots for Total Dissolved Solids Concentrations from LineCreek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

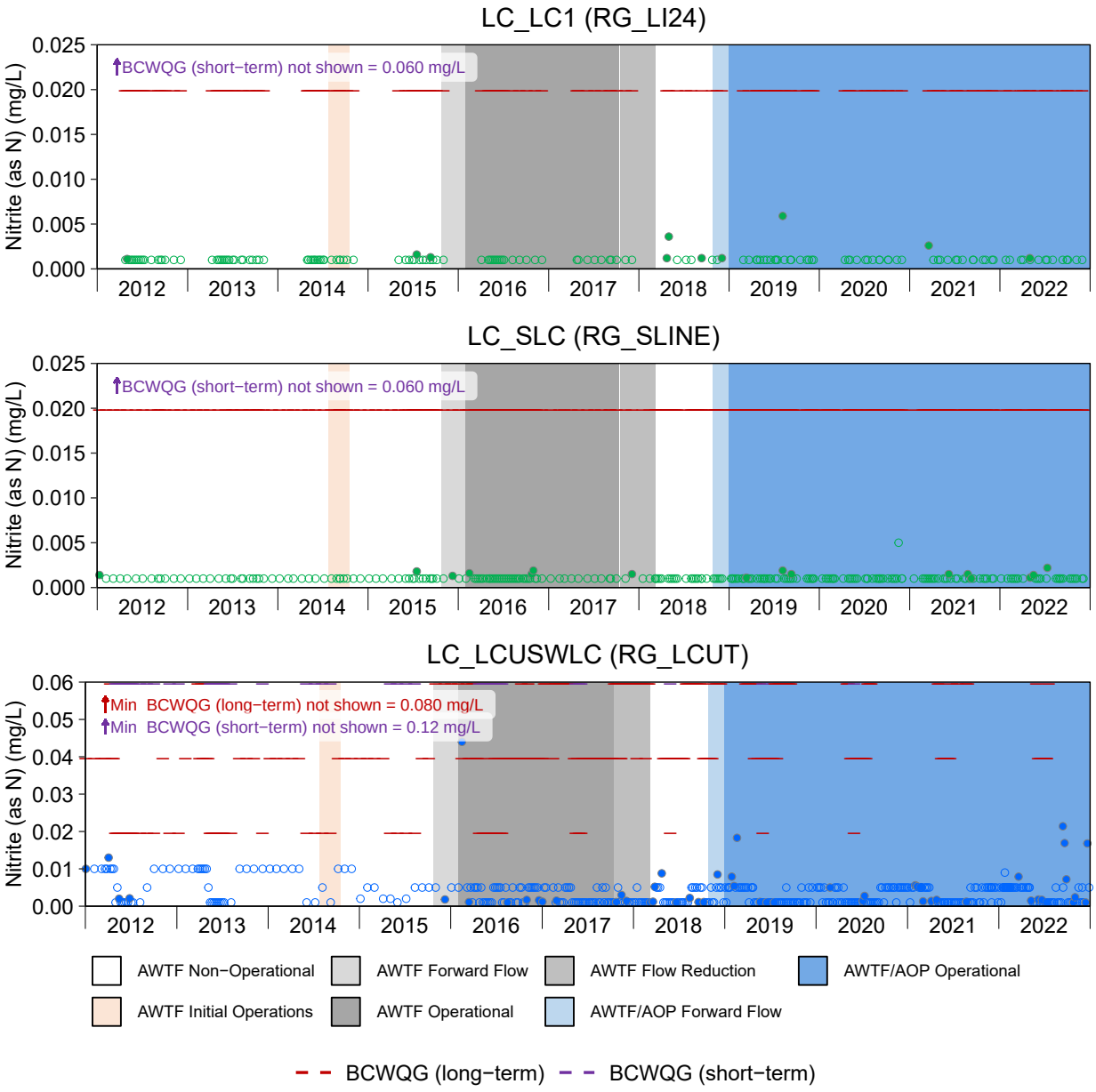


Figure E.2: Time Series Plots for Nitrite (as N) Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

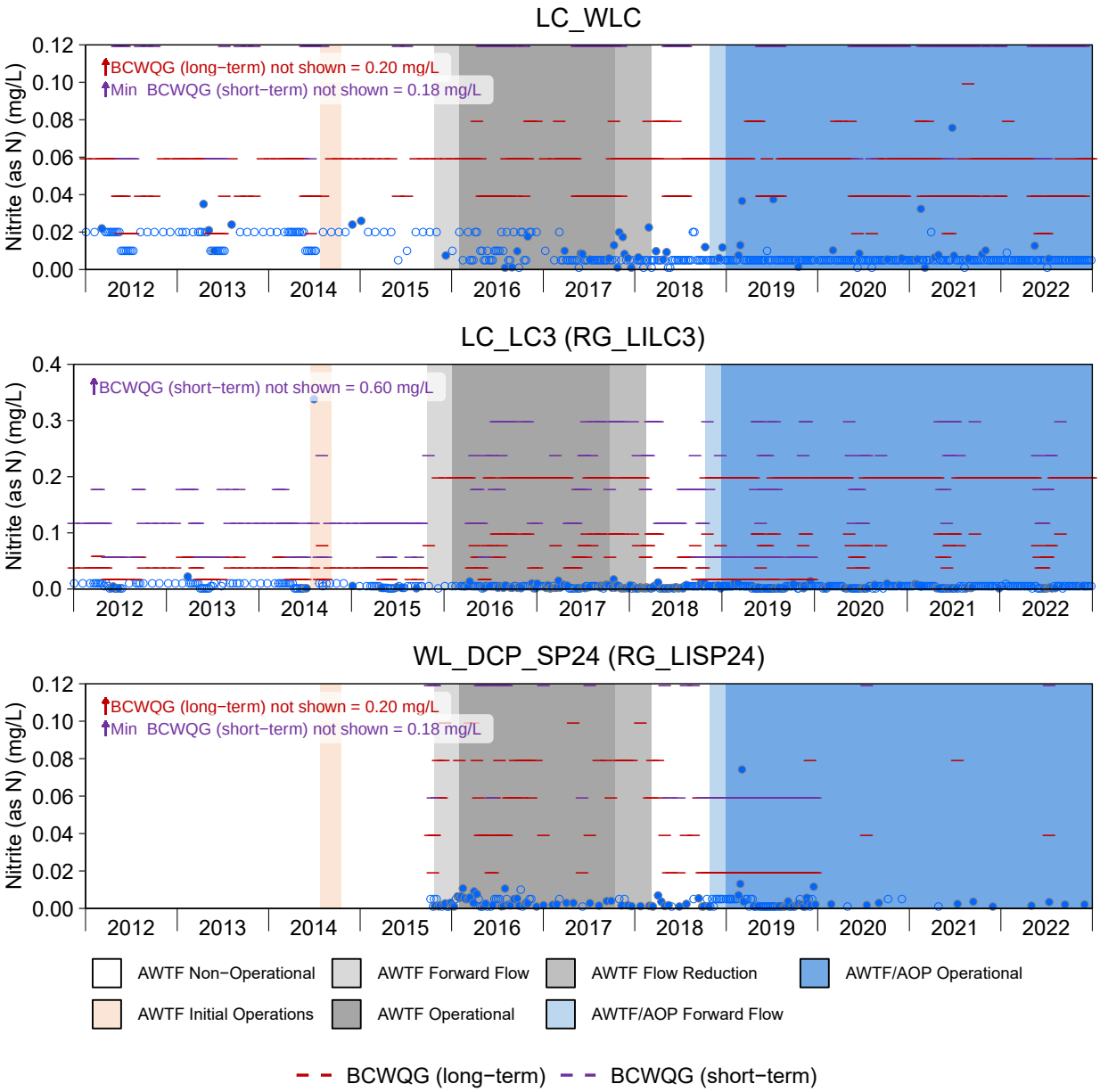


Figure E.2: Time Series Plots for Nitrite (as N) Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

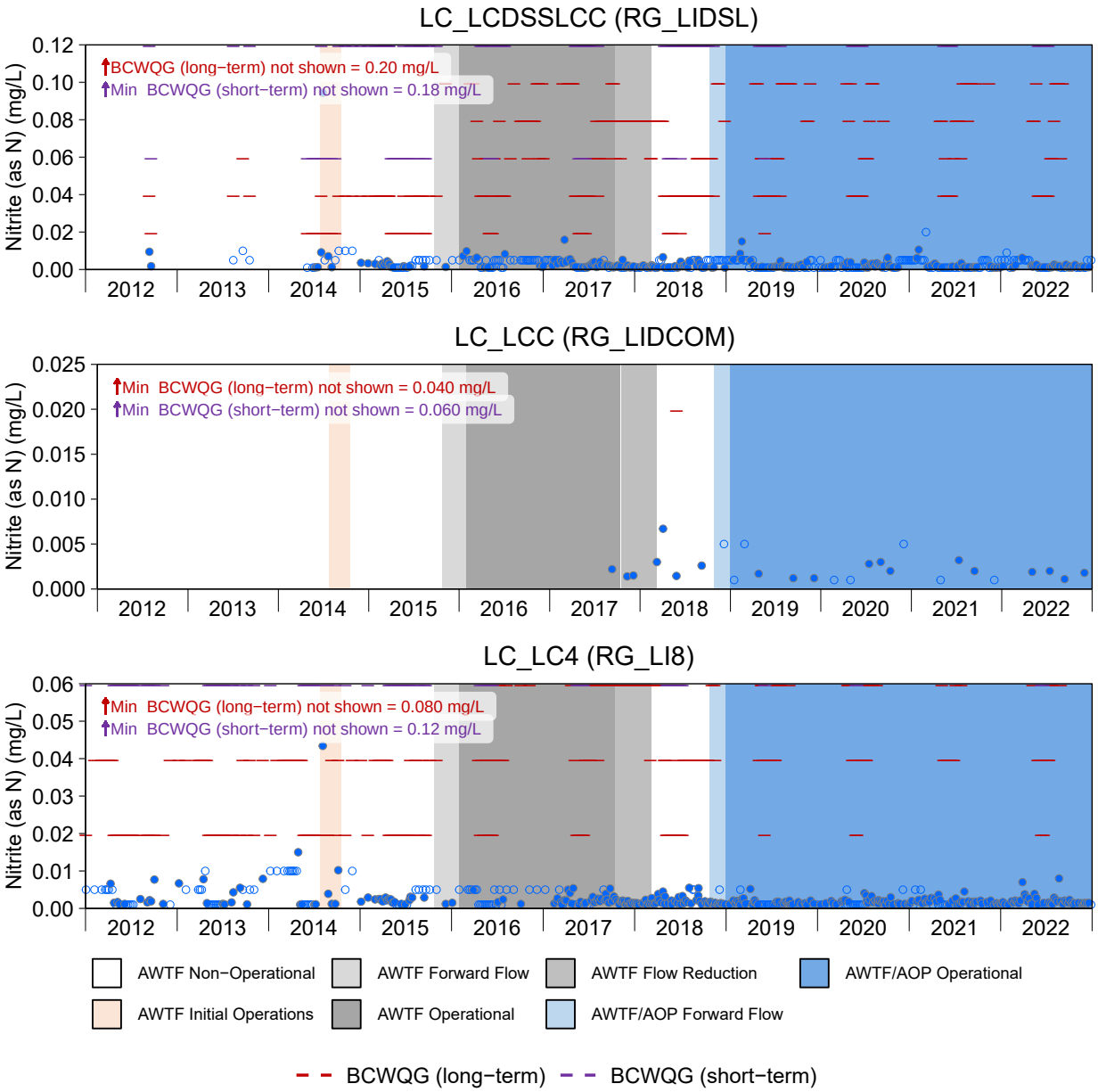


Figure E.2: Time Series Plots for Nitrite (as N) Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

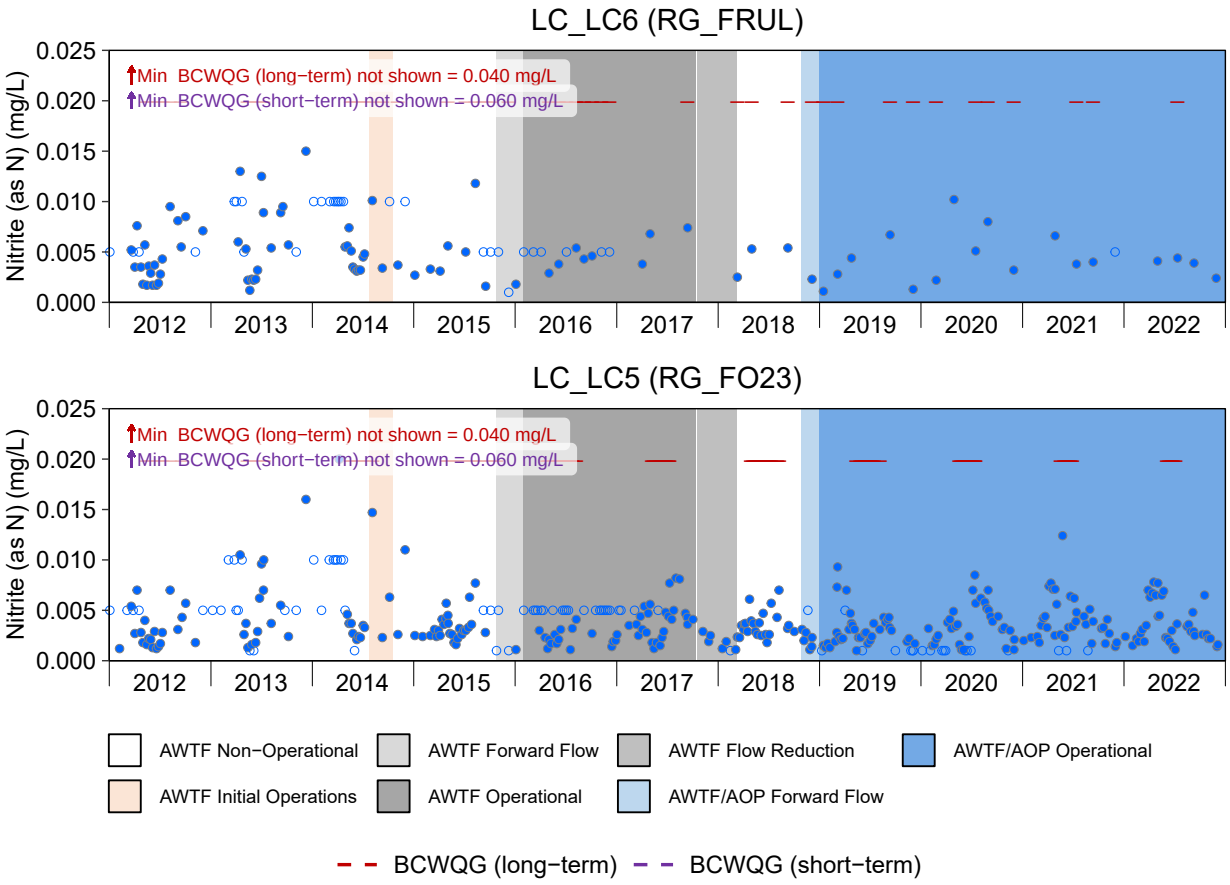


Figure E.2: Time Series Plots for Nitrite (as N) Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

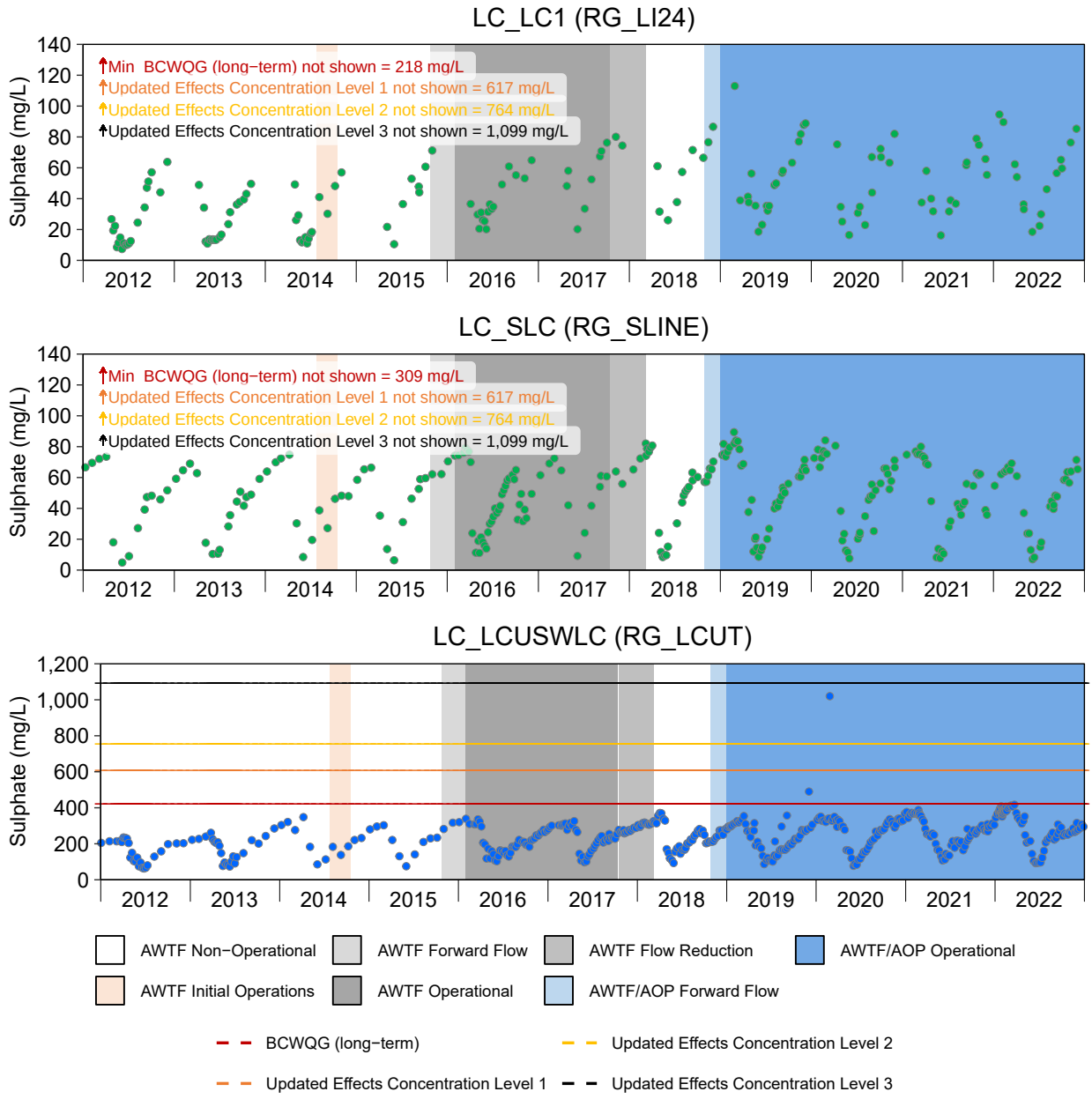


Figure E.3: Time Series Plots for Sulphate Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. EVWQP Level 1 Benchmark is shown in plots where the EVWQP Level 1 Benchmark and the BCWQG are equal. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

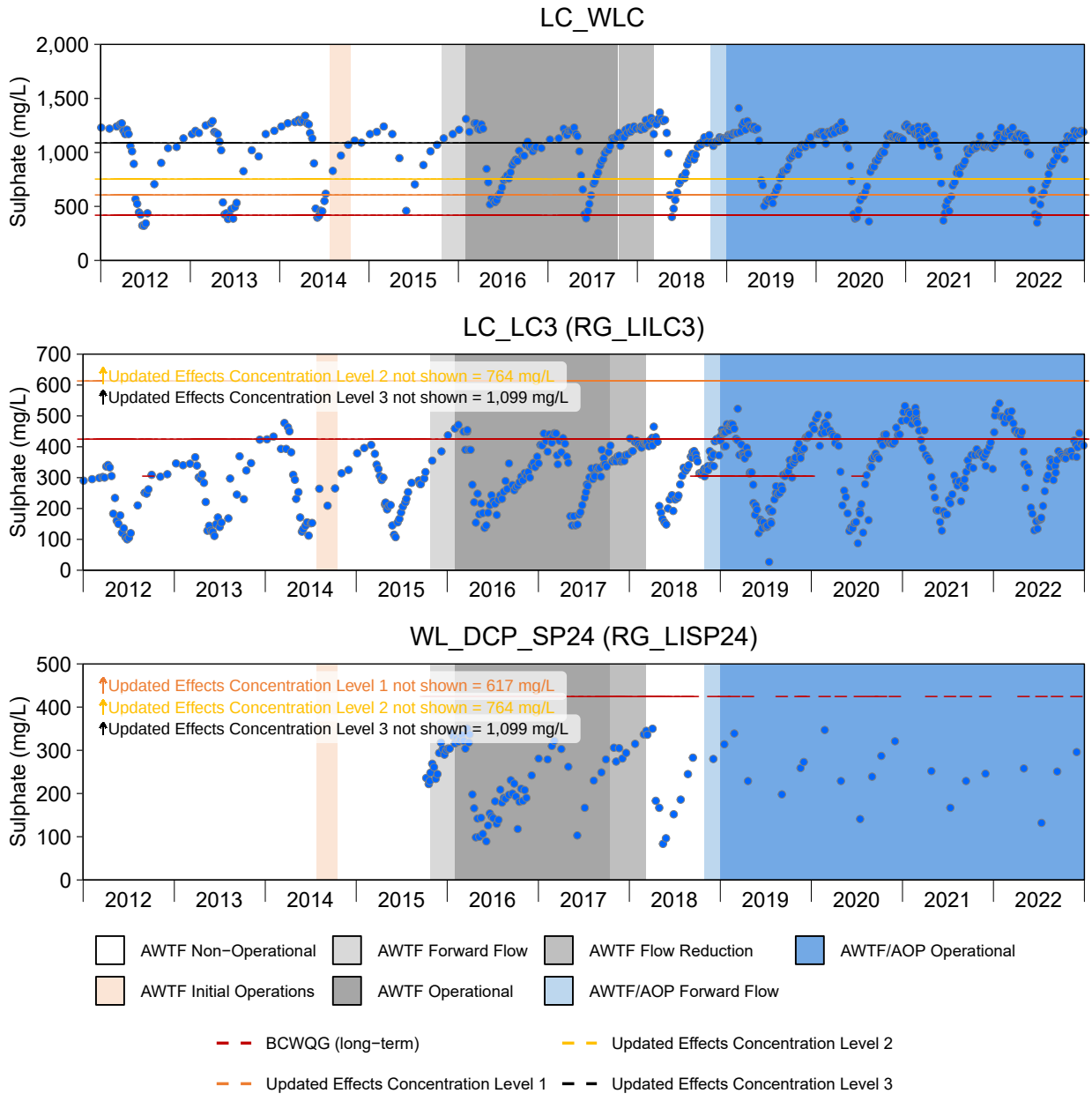


Figure E.3: Time Series Plots for Sulphate Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. EVWQP Level 1 Benchmark is shown in plots where the EVWQP Level 1 Benchmark and the BCWQG are equal. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

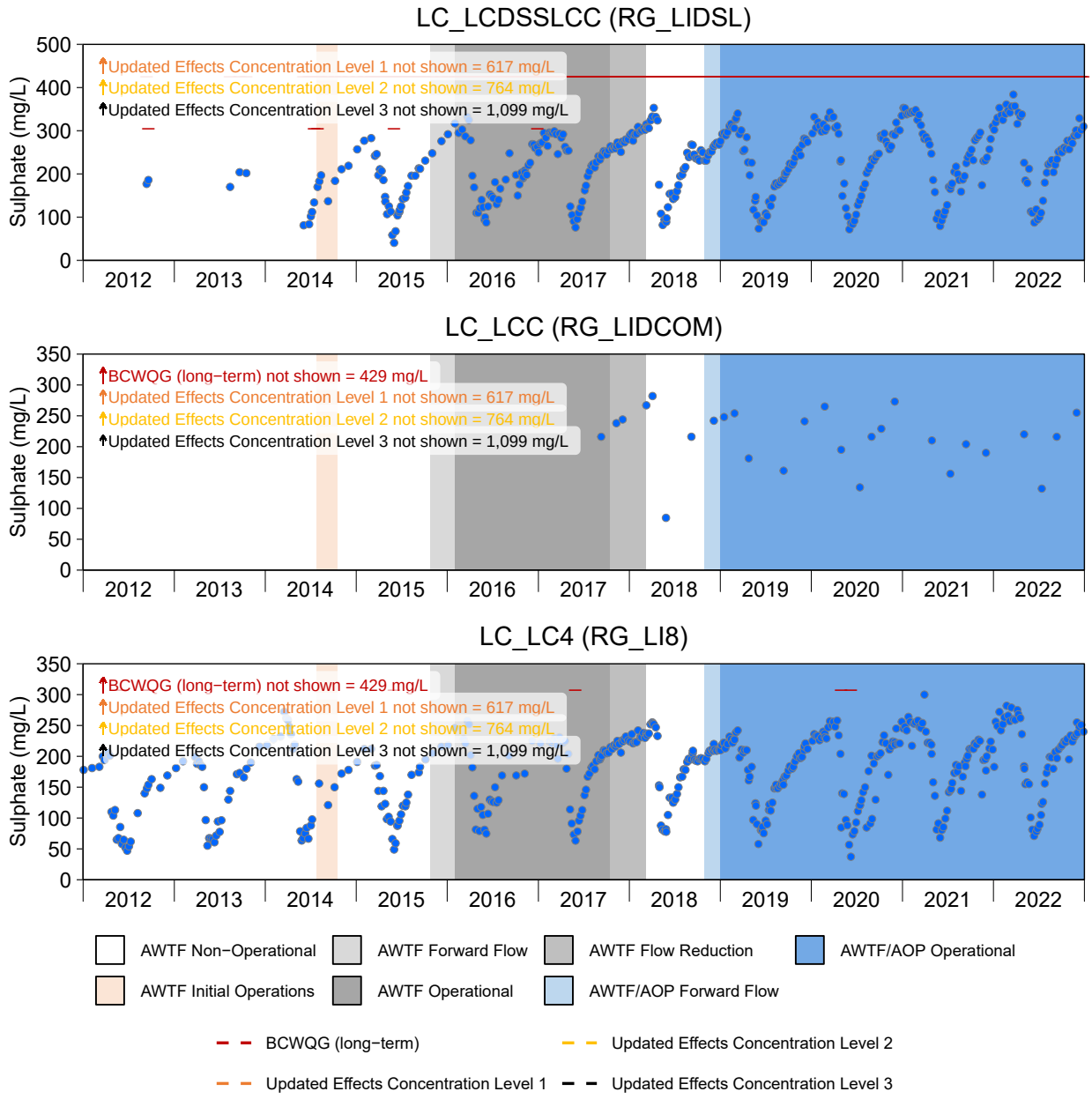


Figure E.3: Time Series Plots for Sulphate Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. EVWQP Level 1 Benchmark is shown in plots where the EVWQP Level 1 Benchmark and the BCWQG are equal. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

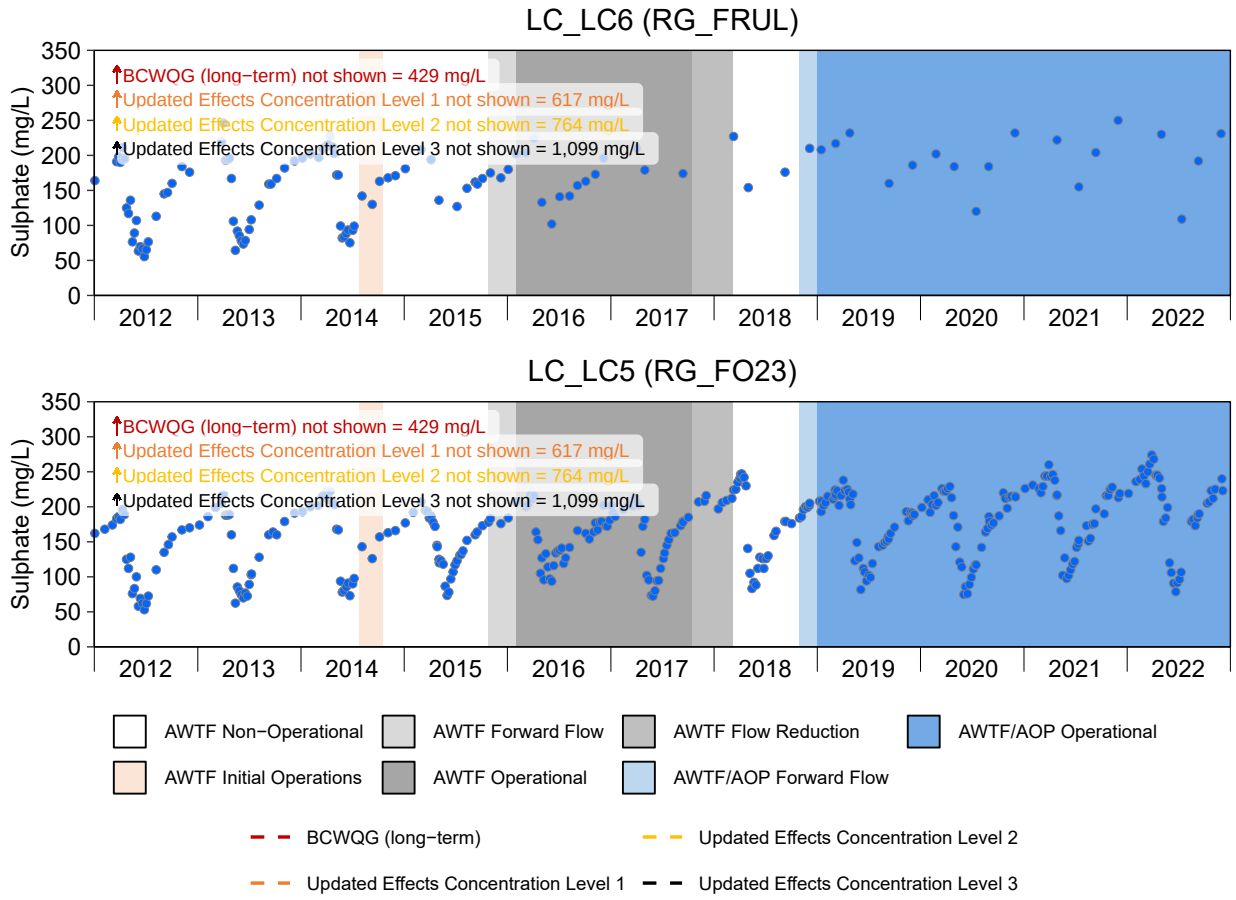


Figure E.3: Time Series Plots for Sulphate Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. EVWQP Level 1 Benchmark is shown in plots where the EVWQP Level 1 Benchmark and the BCWQG are equal. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

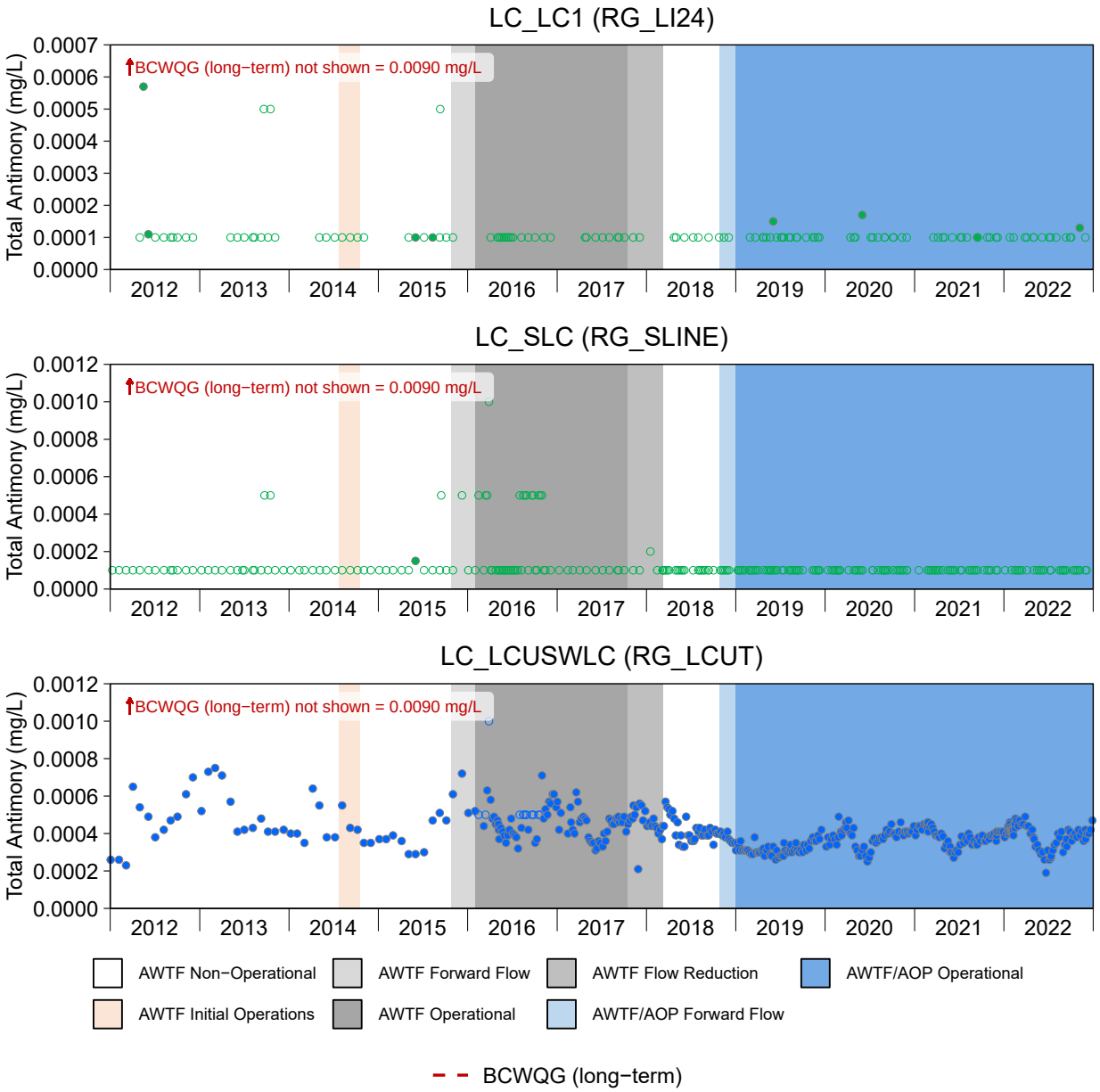


Figure E.4: Time Series Plots for Total Antimony Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

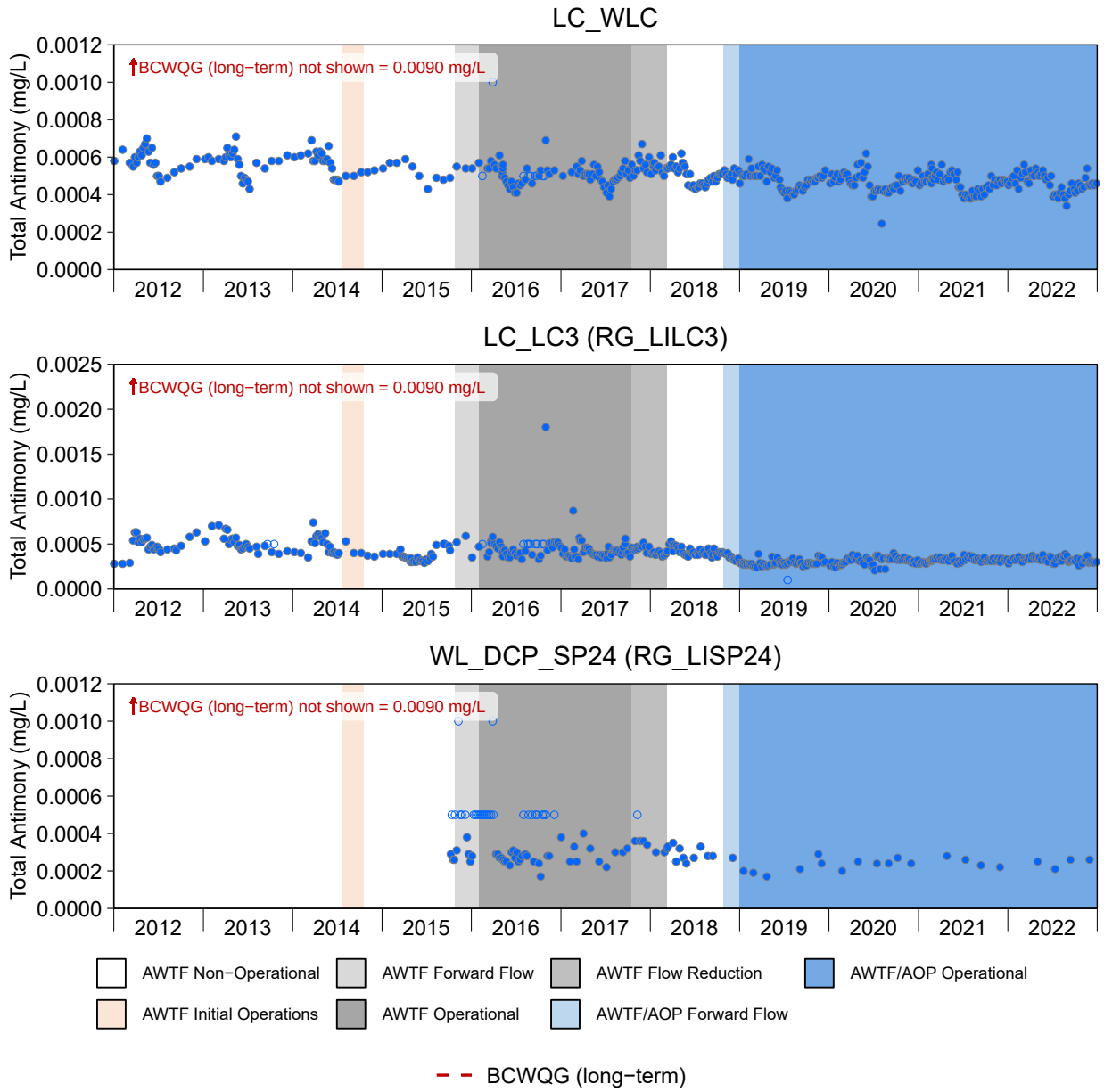


Figure E.4: Time Series Plots for Total Antimony Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

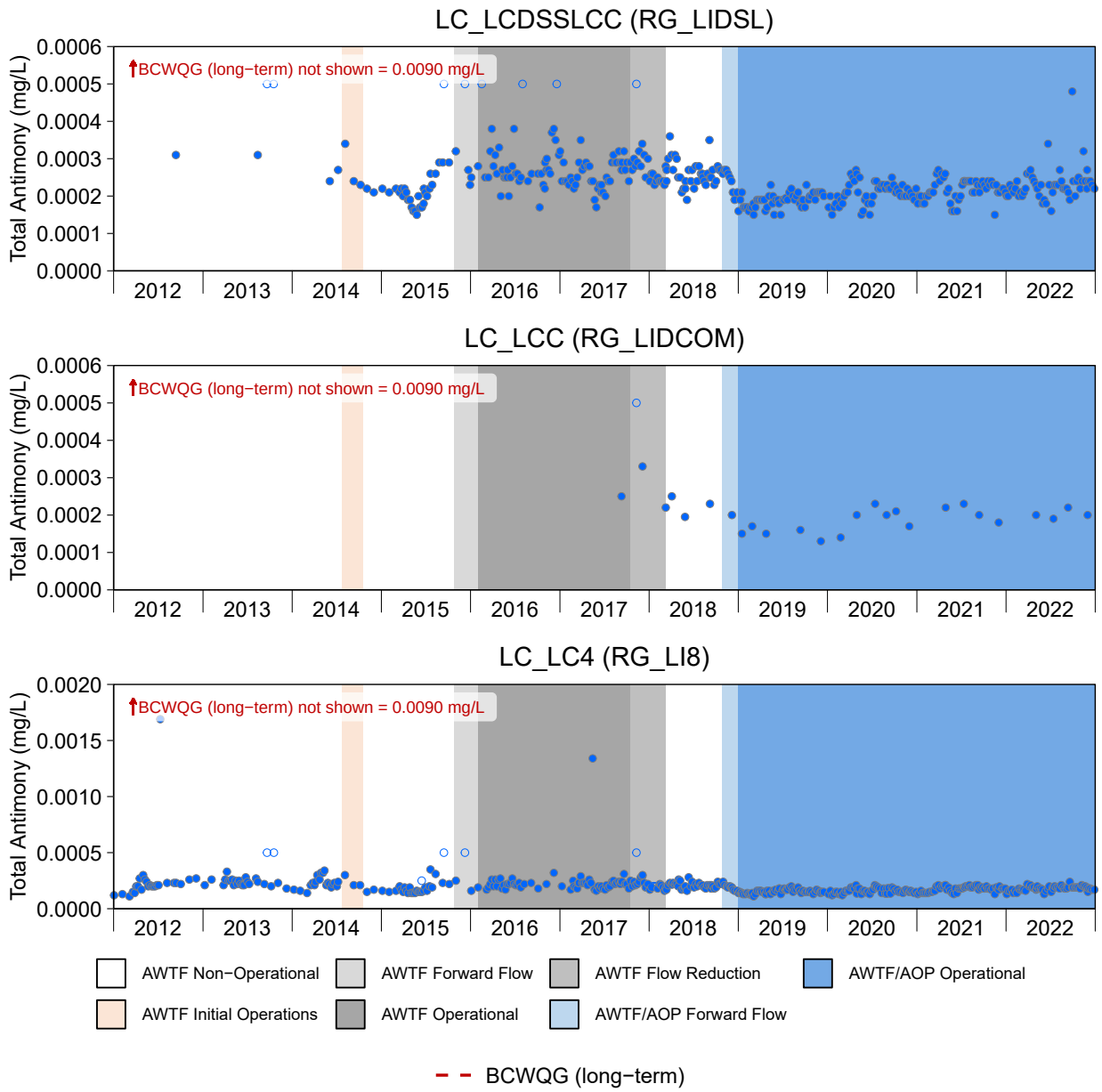


Figure E.4: Time Series Plots for Total Antimony Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

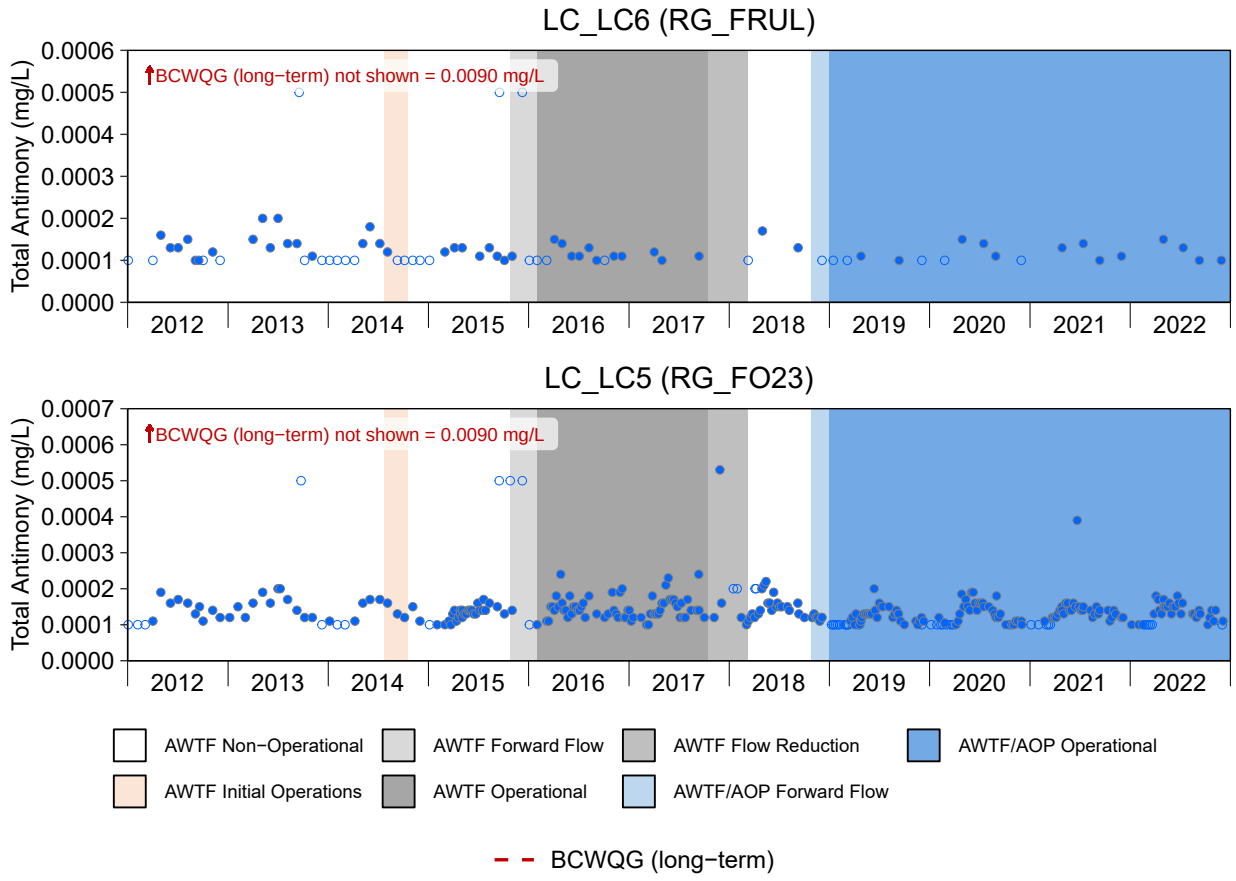


Figure E.4: Time Series Plots for Total Antimony Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

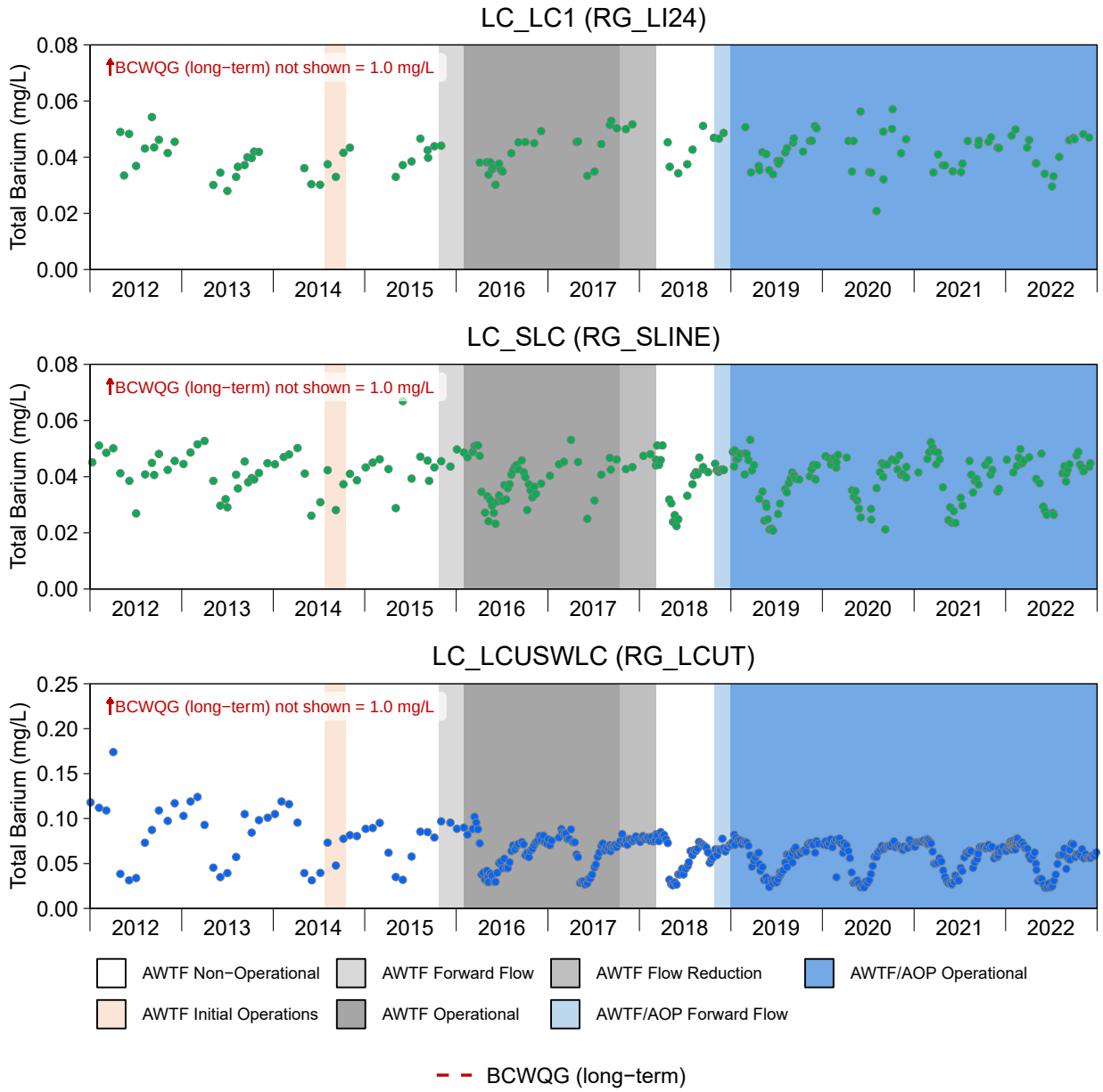


Figure E.5: Time Series Plots for Total Barium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

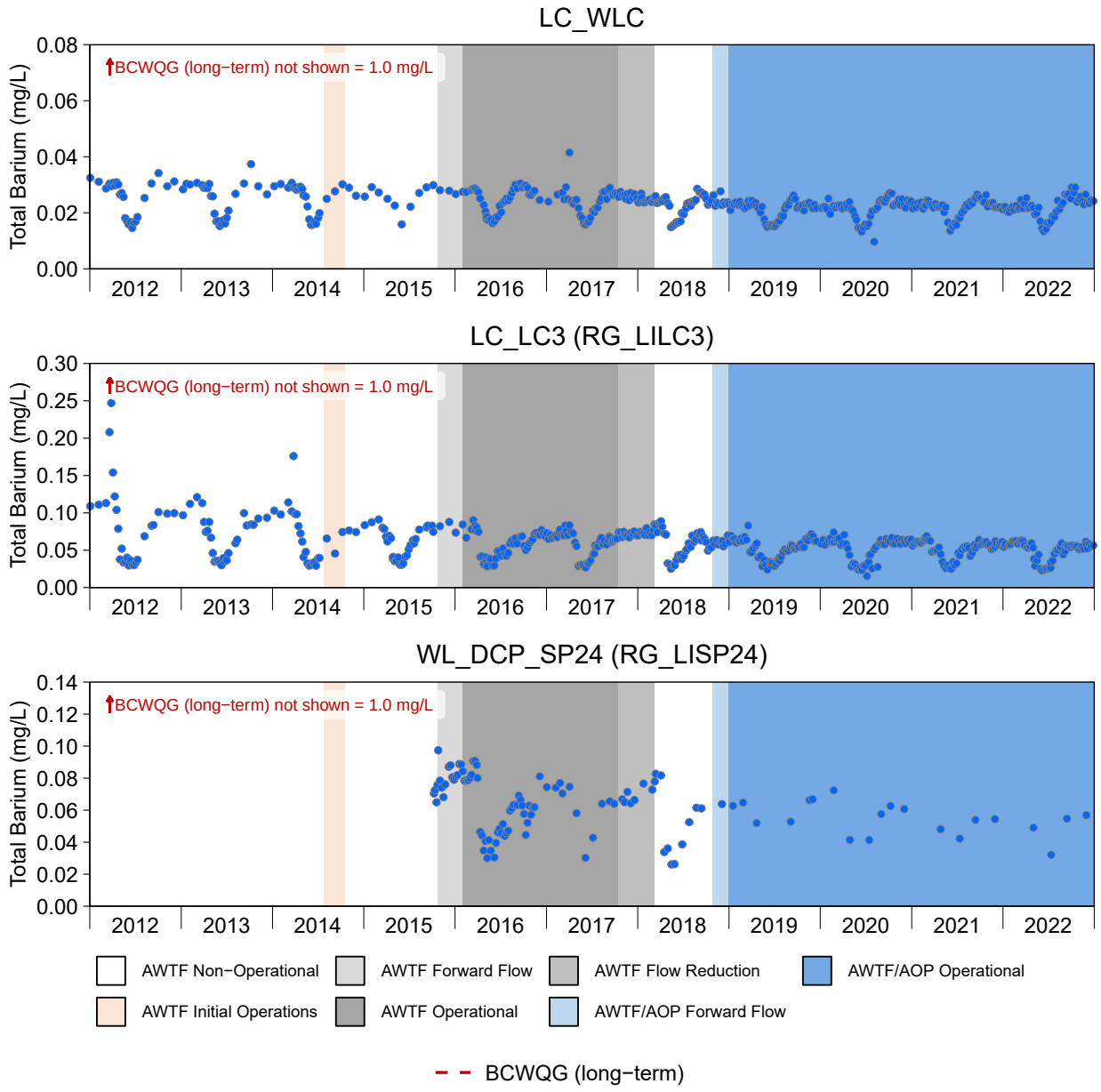


Figure E.5: Time Series Plots for Total Barium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

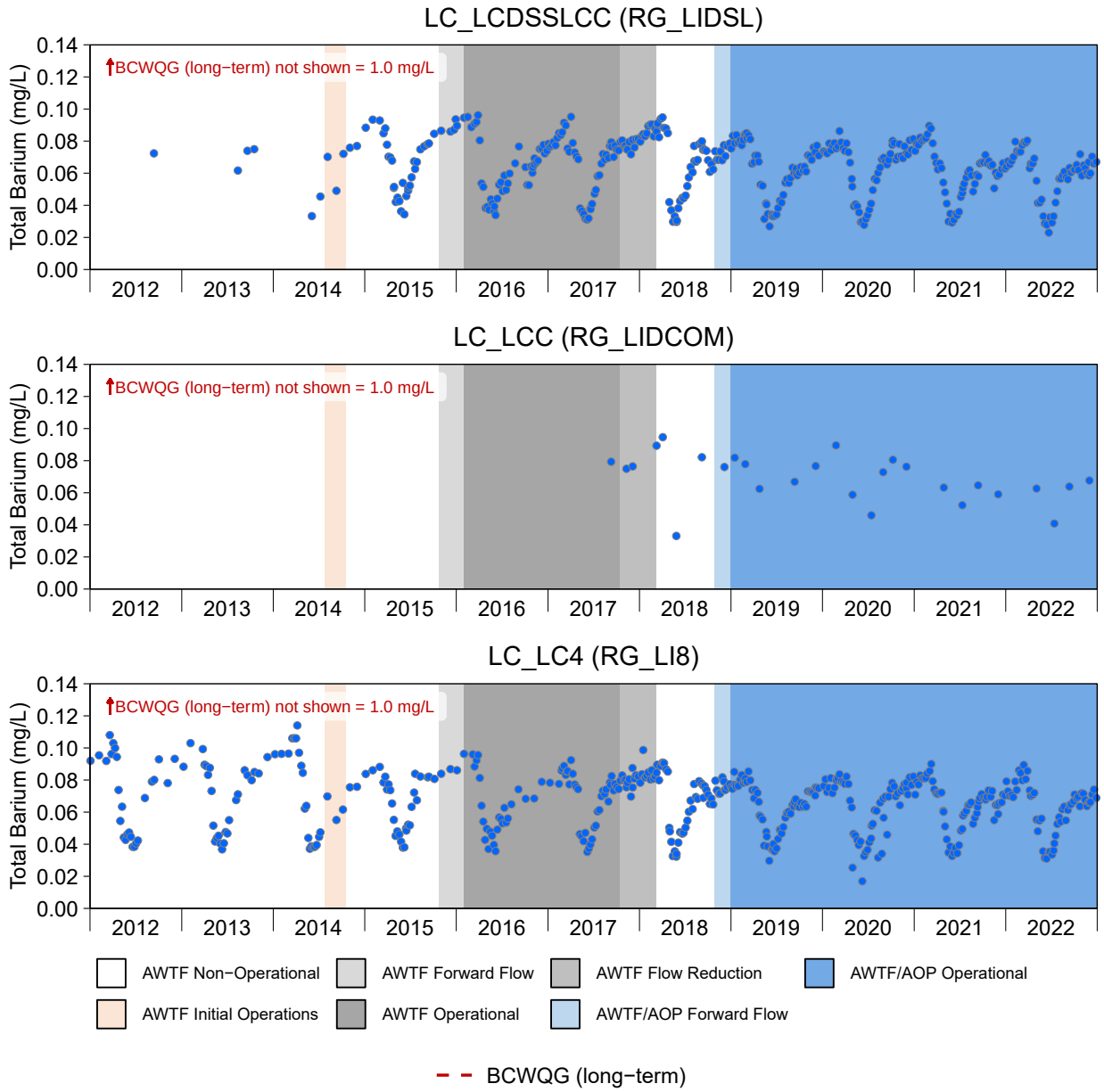


Figure E.5: Time Series Plots for Total Barium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

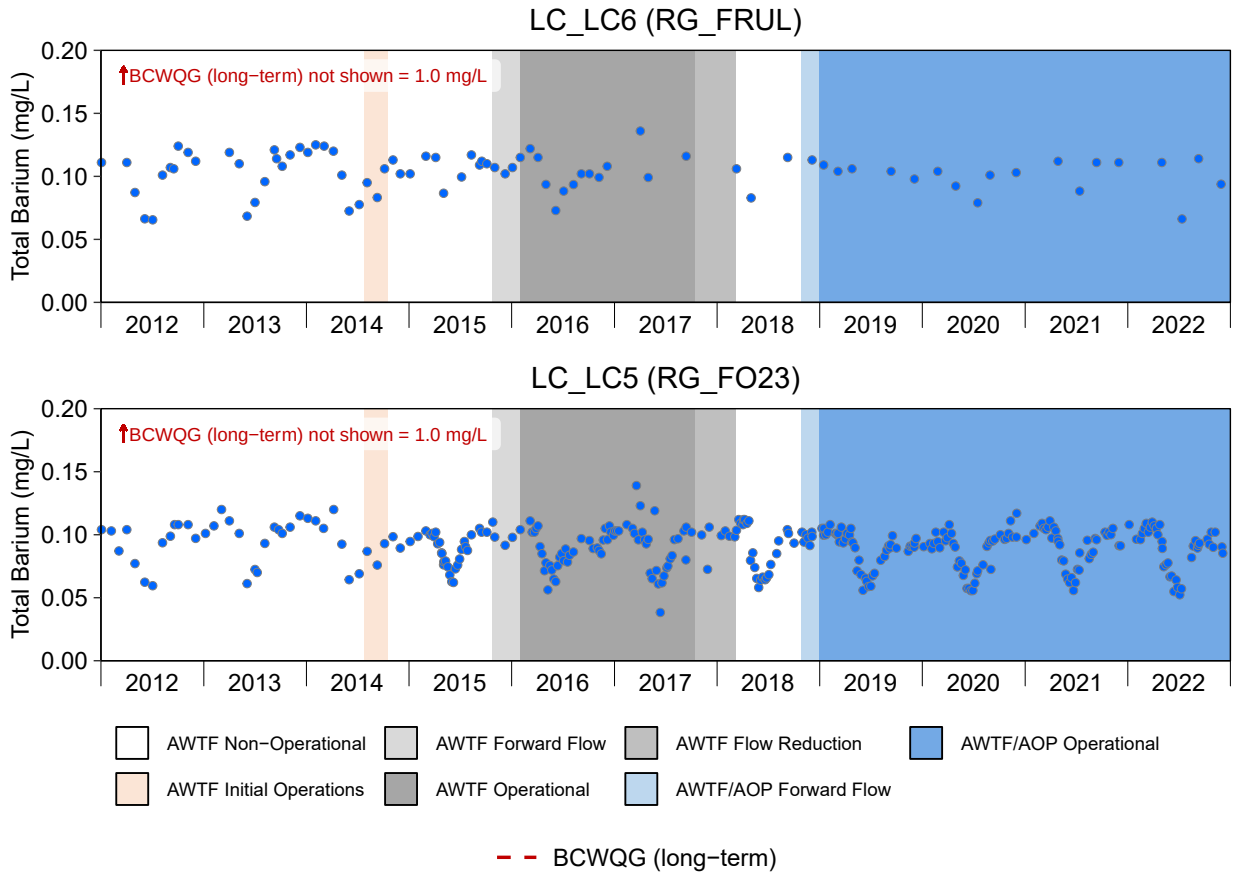


Figure E.5: Time Series Plots for Total Barium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

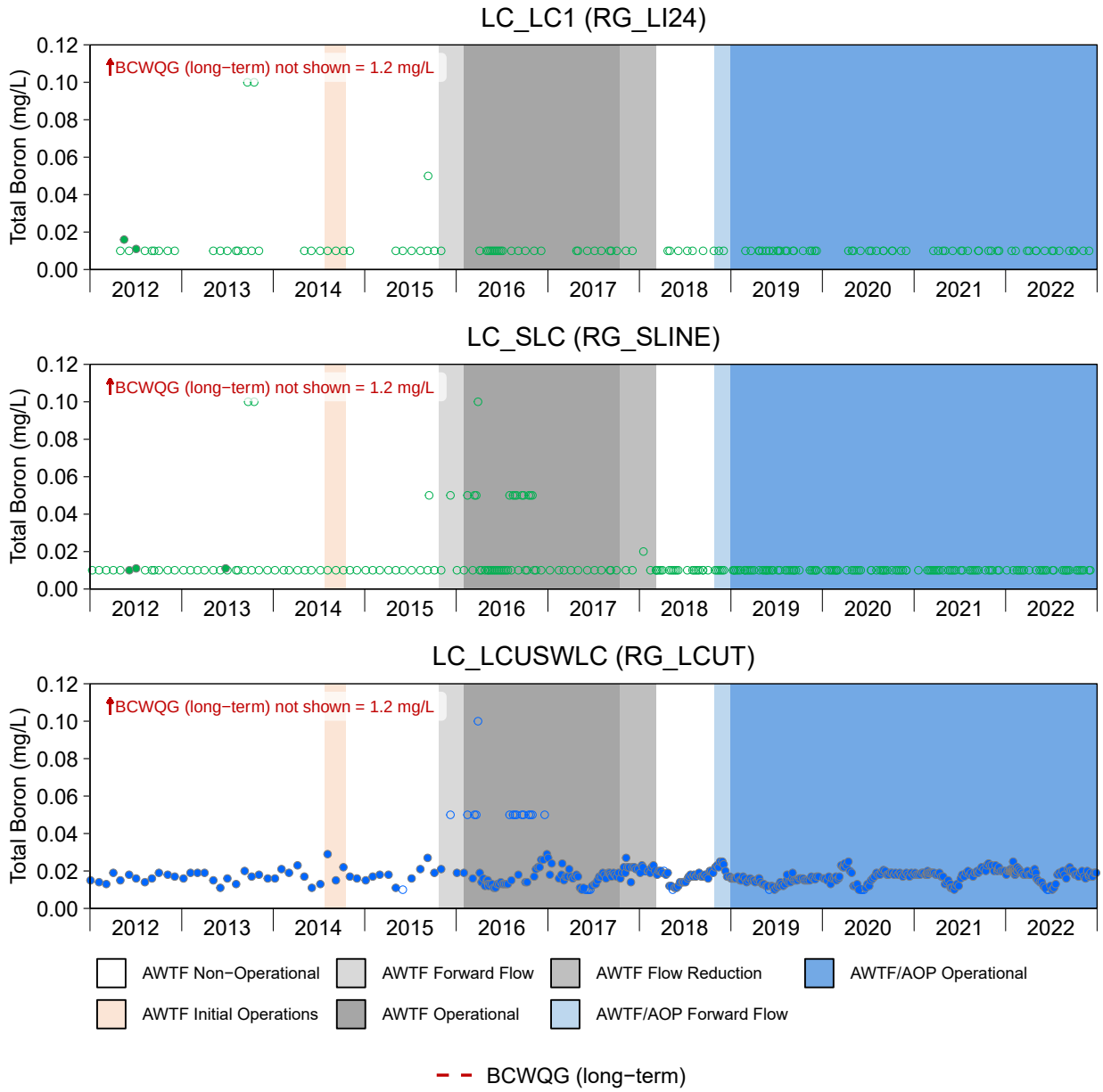


Figure E.6: Time Series Plots for Total Boron Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

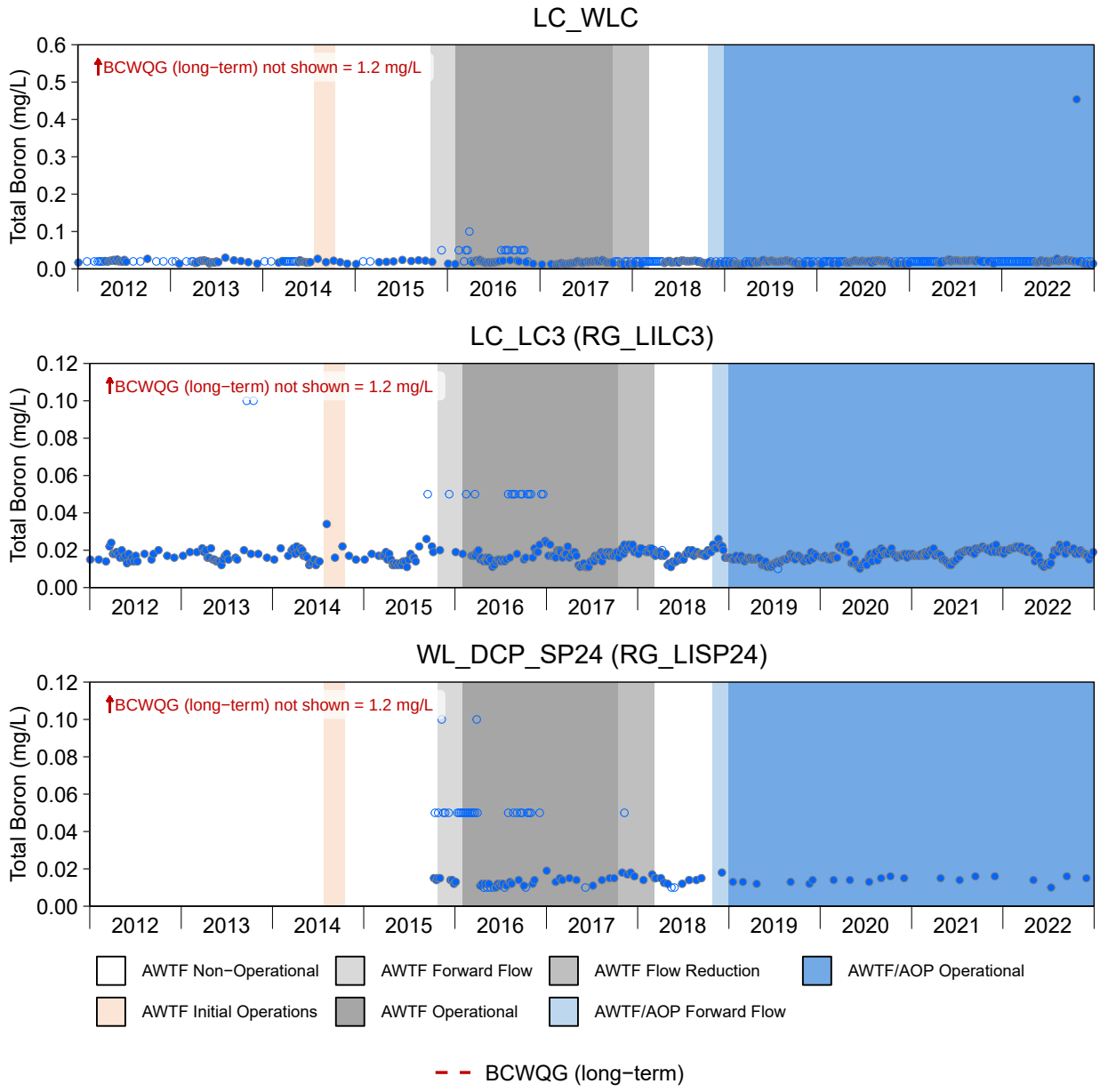


Figure E.6: Time Series Plots for Total Boron Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

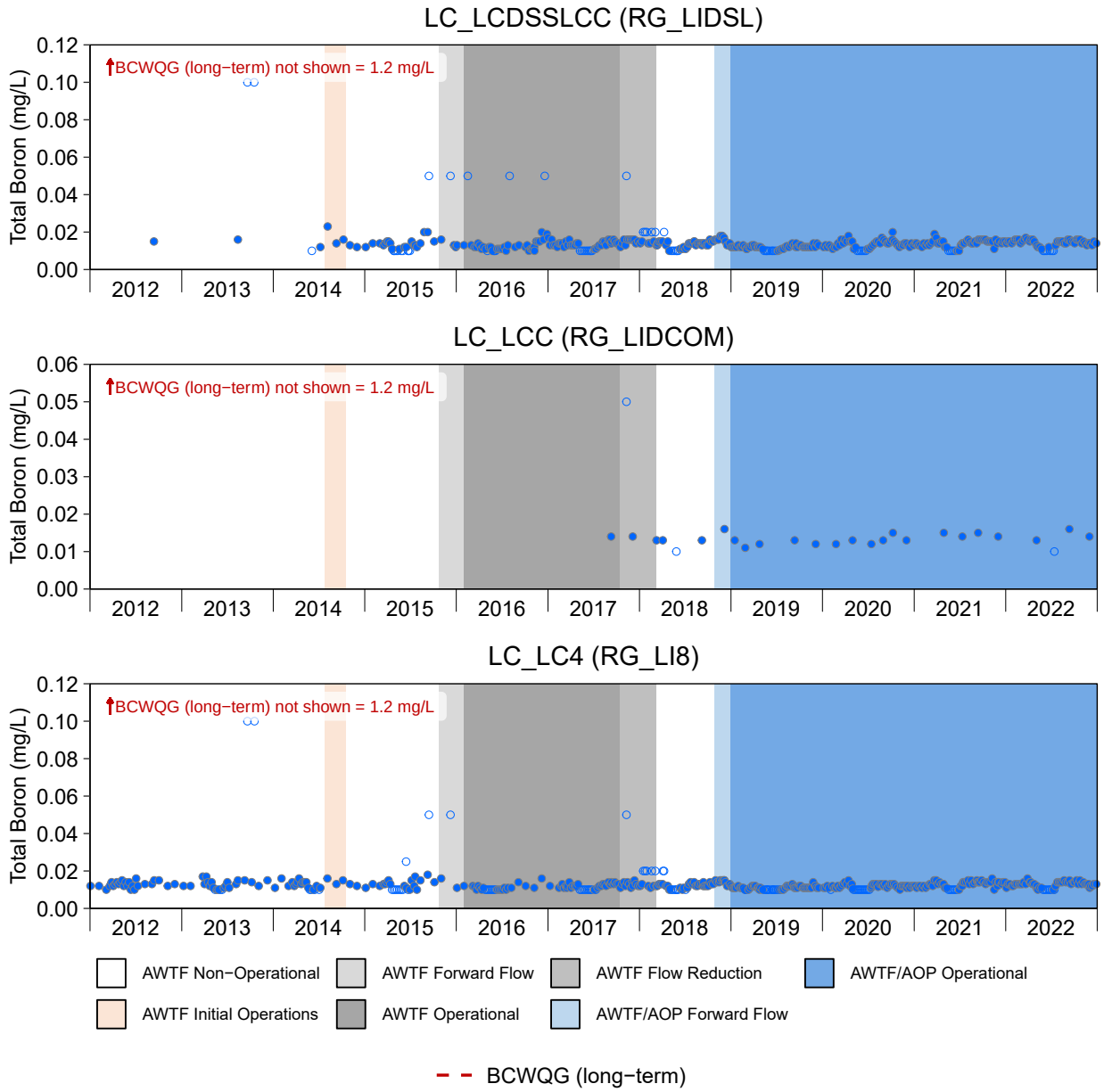


Figure E.6: Time Series Plots for Total Boron Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

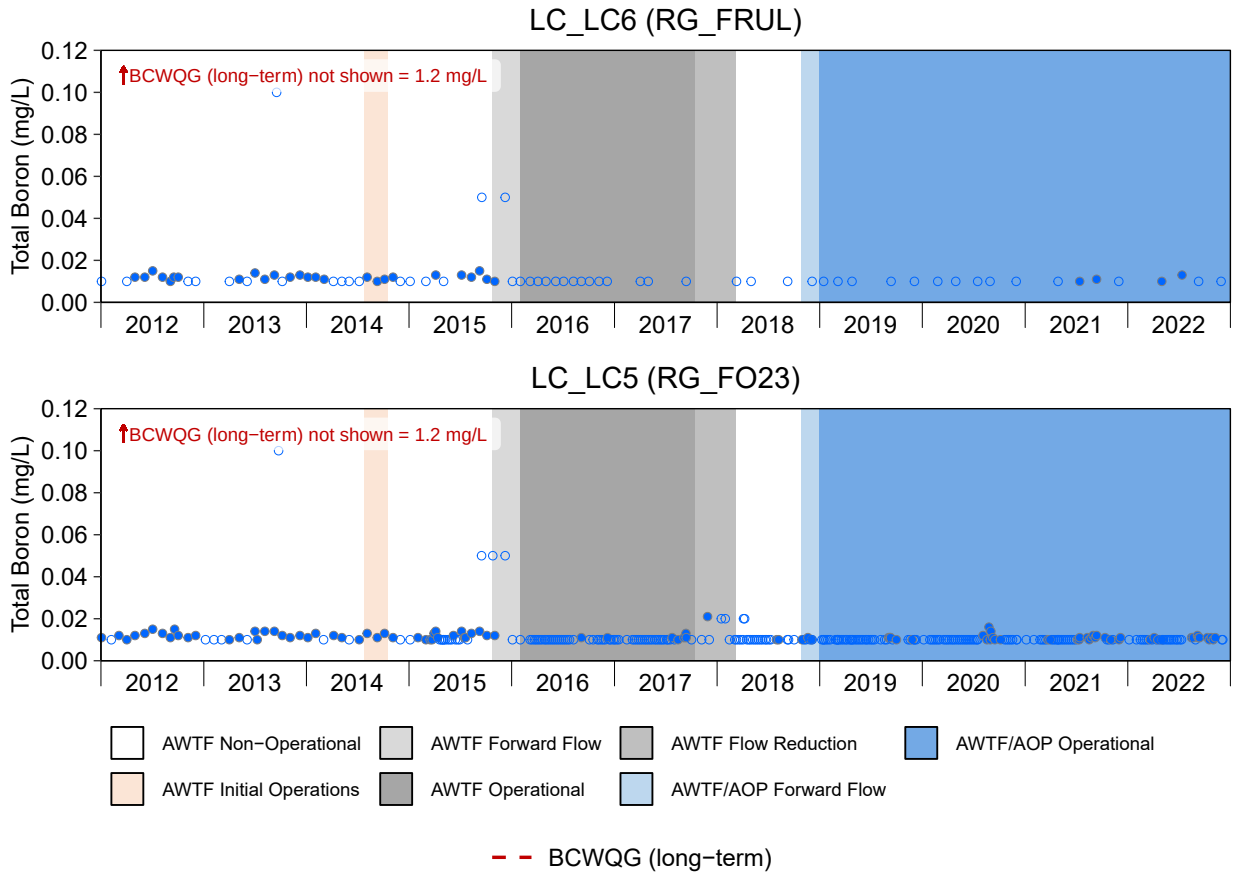


Figure E.6: Time Series Plots for Total Boron Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

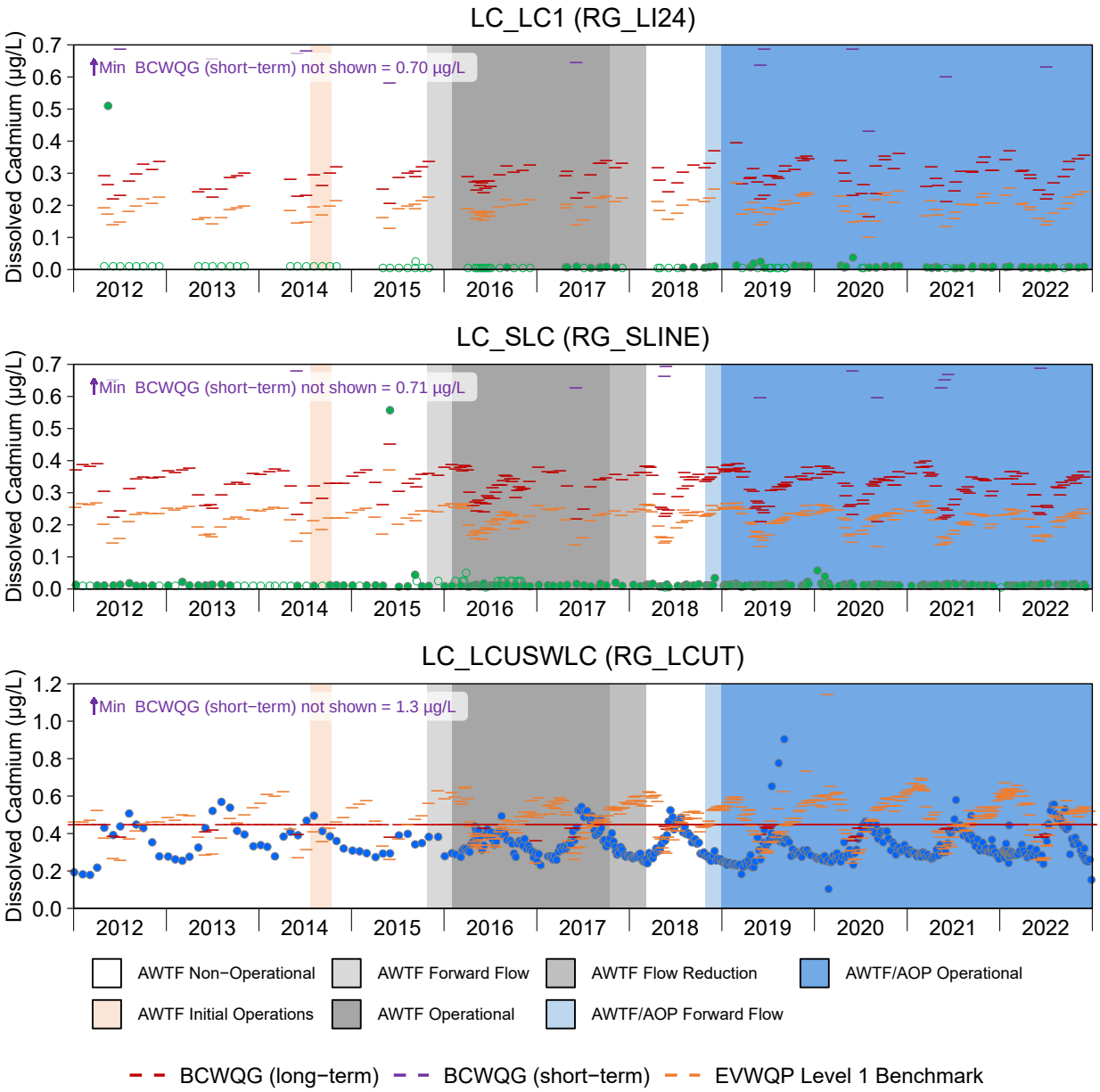


Figure E.7: Time Series Plots for Dissolved Cadmium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

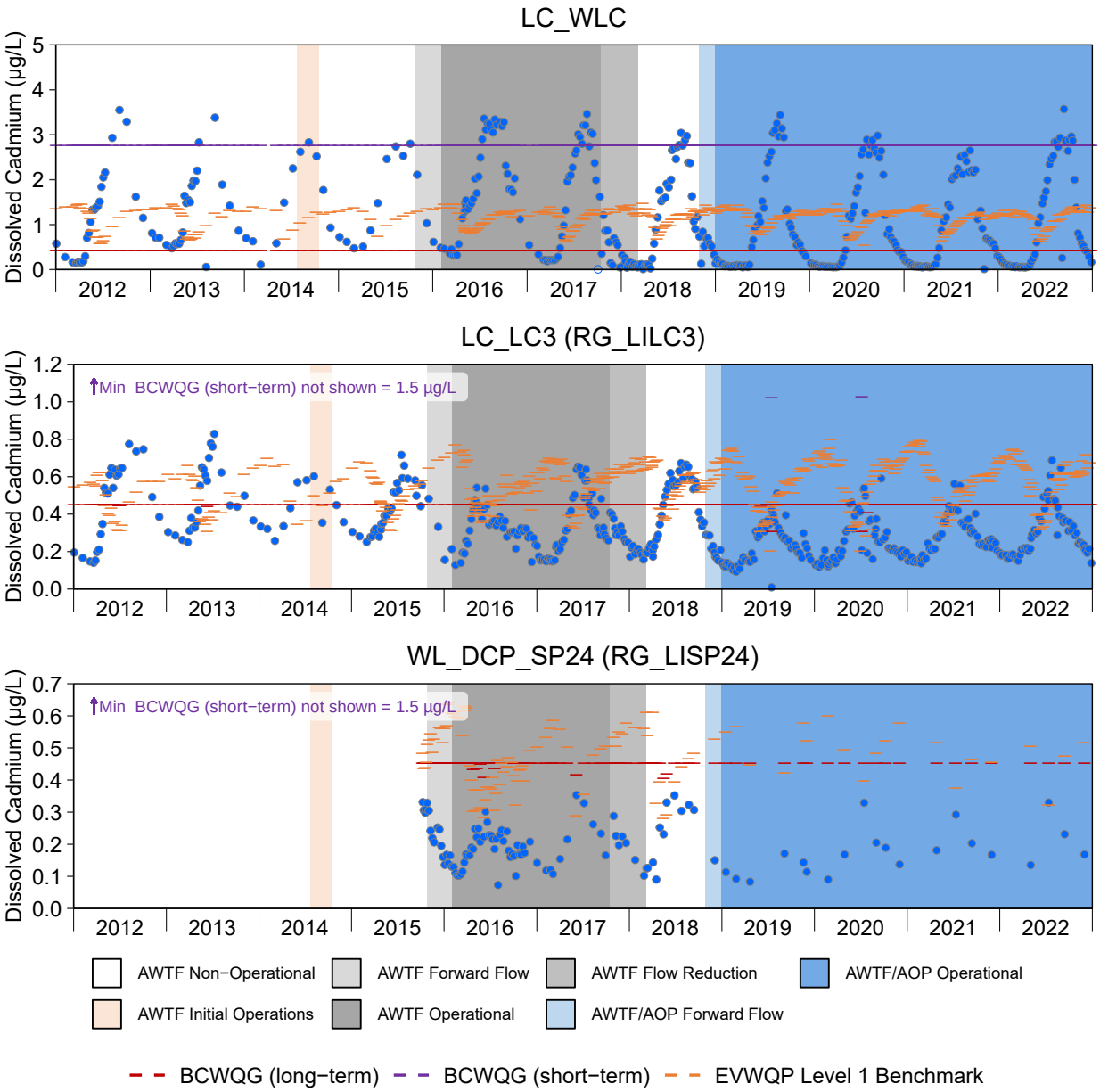


Figure E.7: Time Series Plots for Dissolved Cadmium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

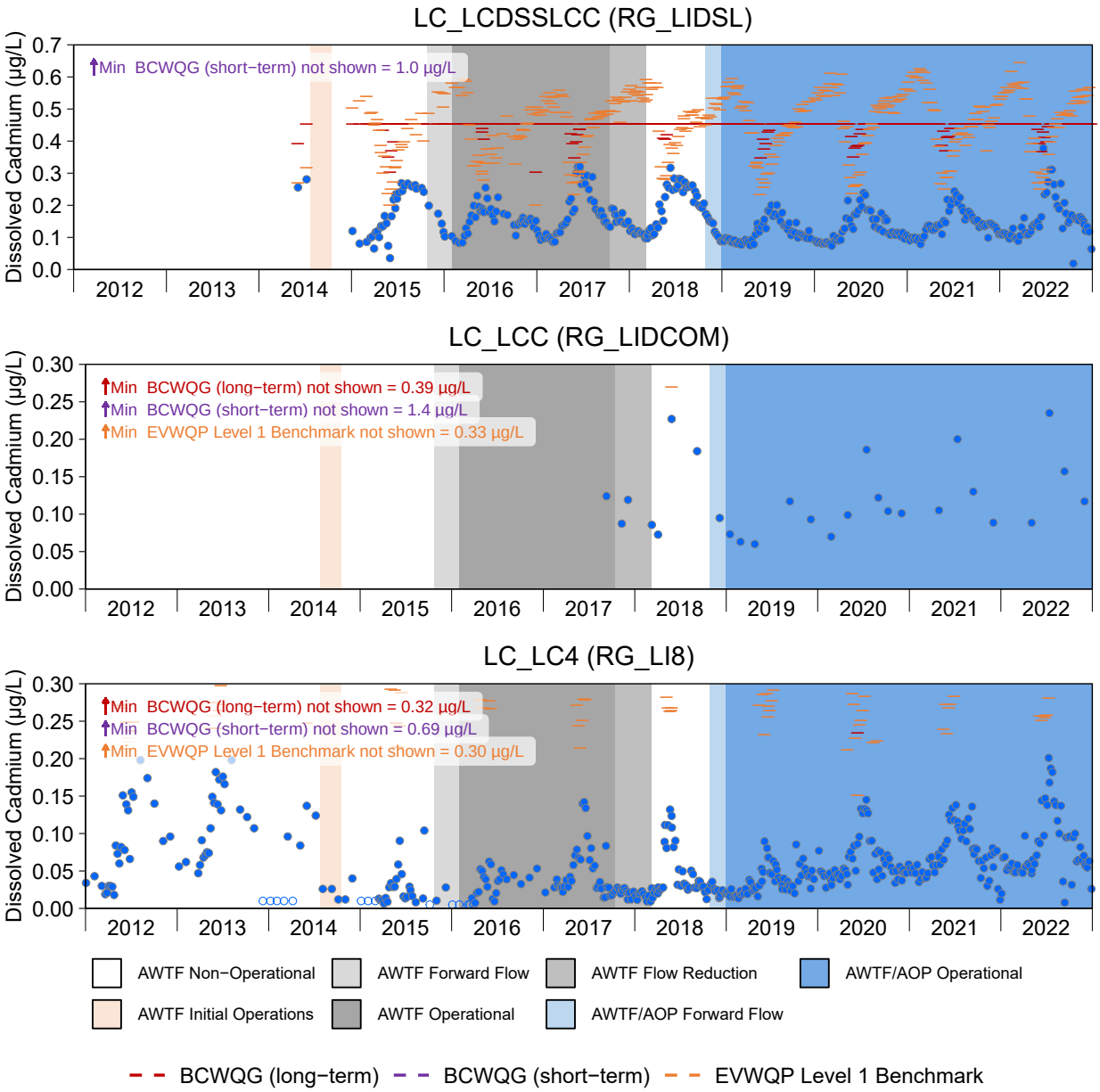


Figure E.7: Time Series Plots for Dissolved Cadmium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

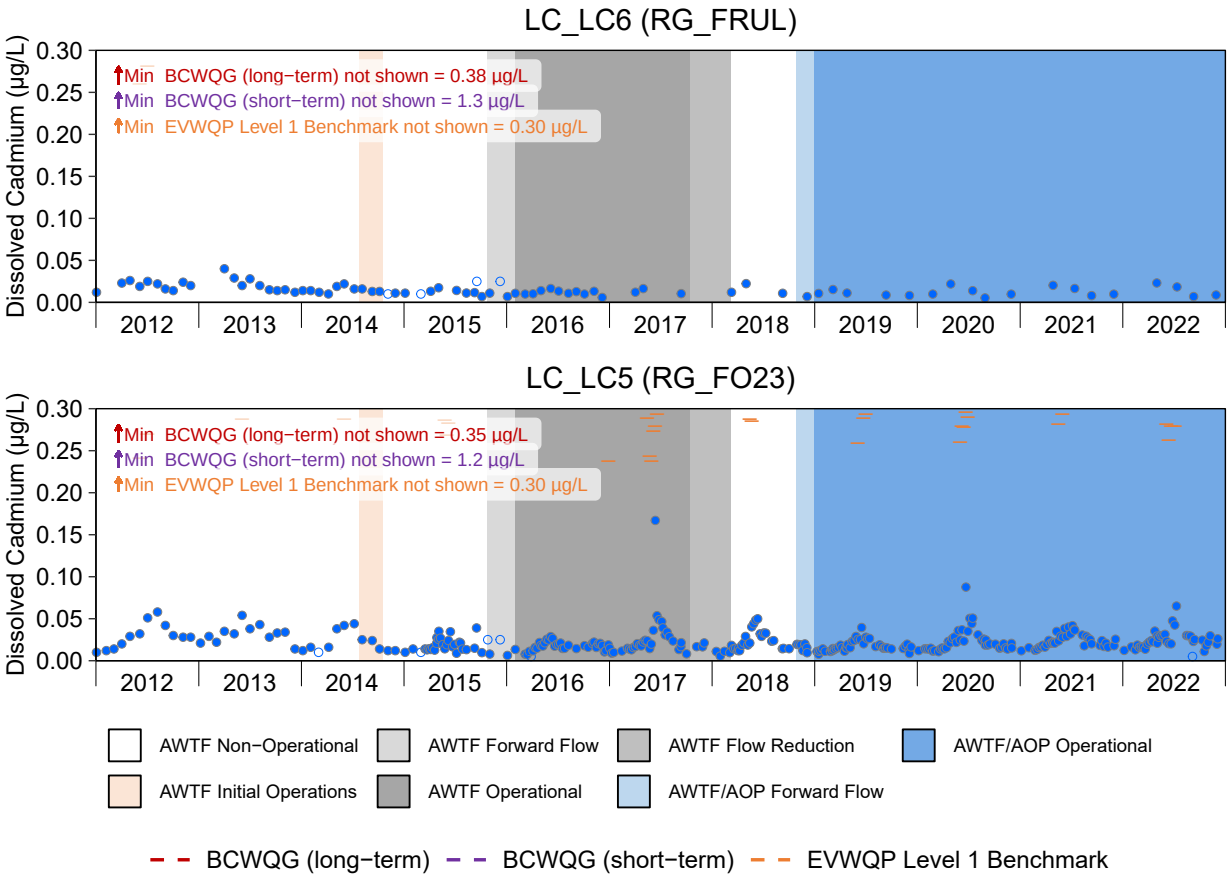


Figure E.7: Time Series Plots for Dissolved Cadmium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

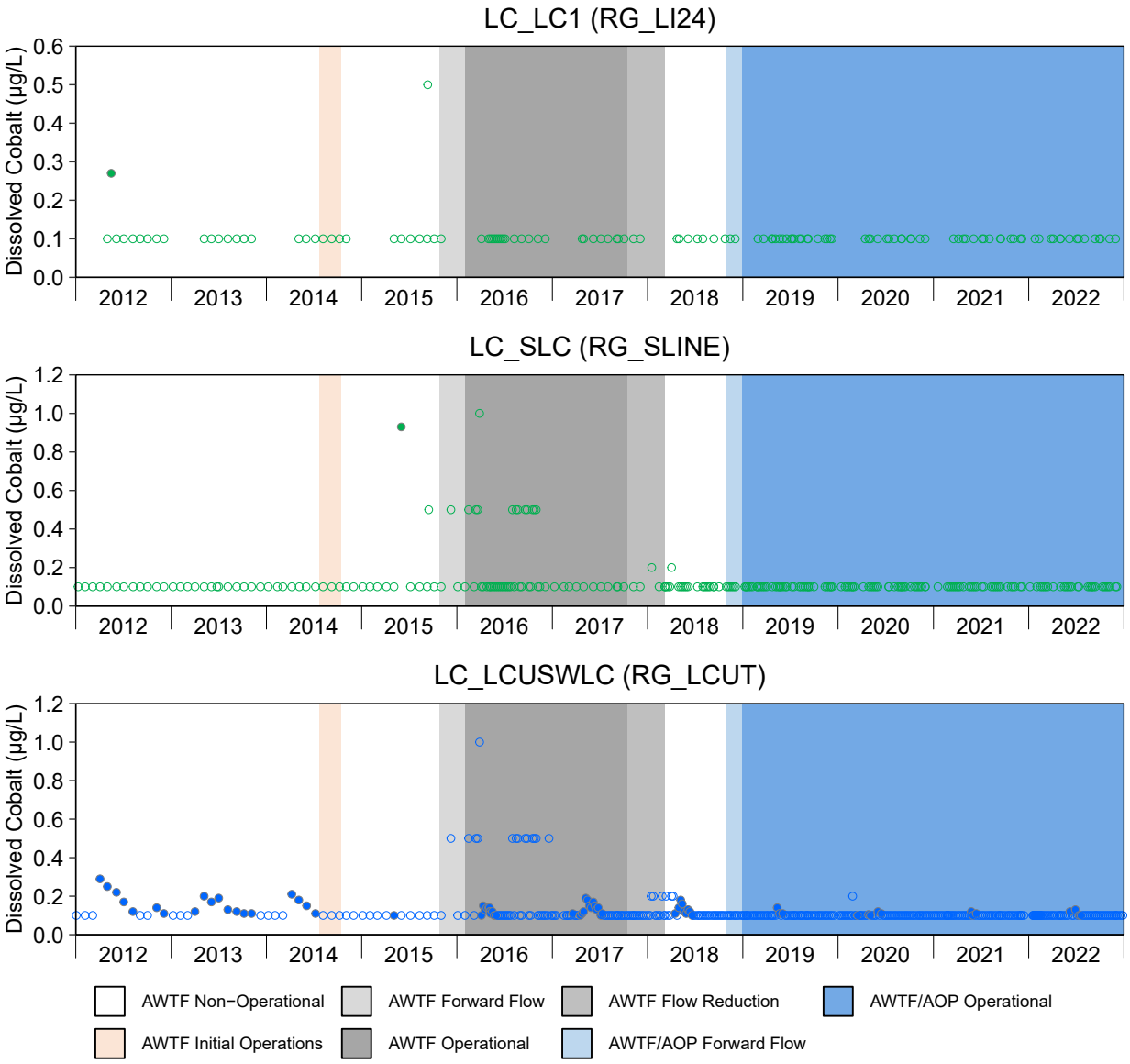


Figure E.8: Time Series Plots for Dissolved Cobalt Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Dissolved cobalt was used because bioavailability and toxicity has been associated with the dissolved fraction (Environment Canada 2017; Azimuth 2018). Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

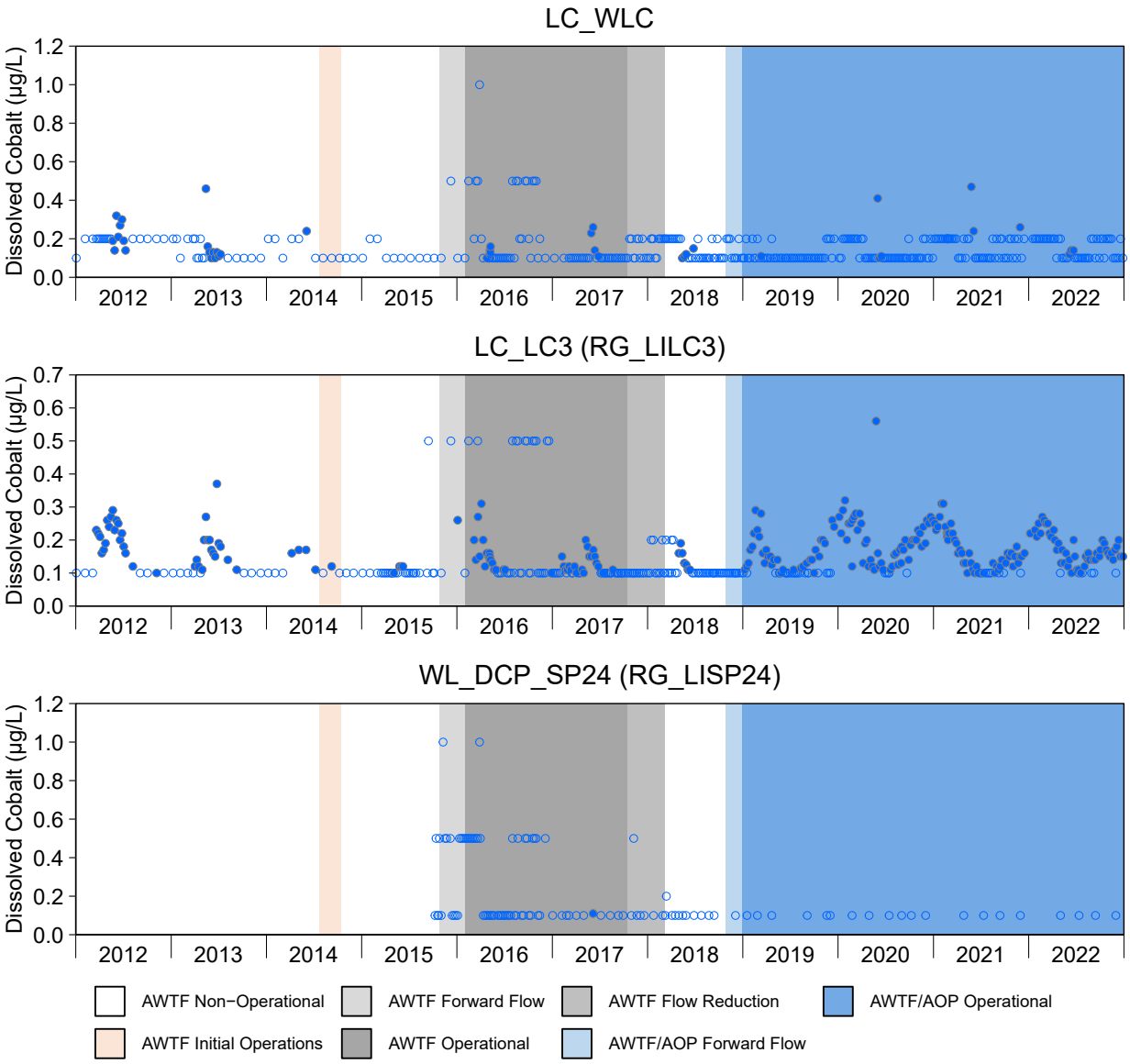


Figure E.8: Time Series Plots for Dissolved Cobalt Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Dissolved cobalt was used because bioavailability and toxicity has been associated with the dissolved fraction (Environment Canada 2017; Azimuth 2018). Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

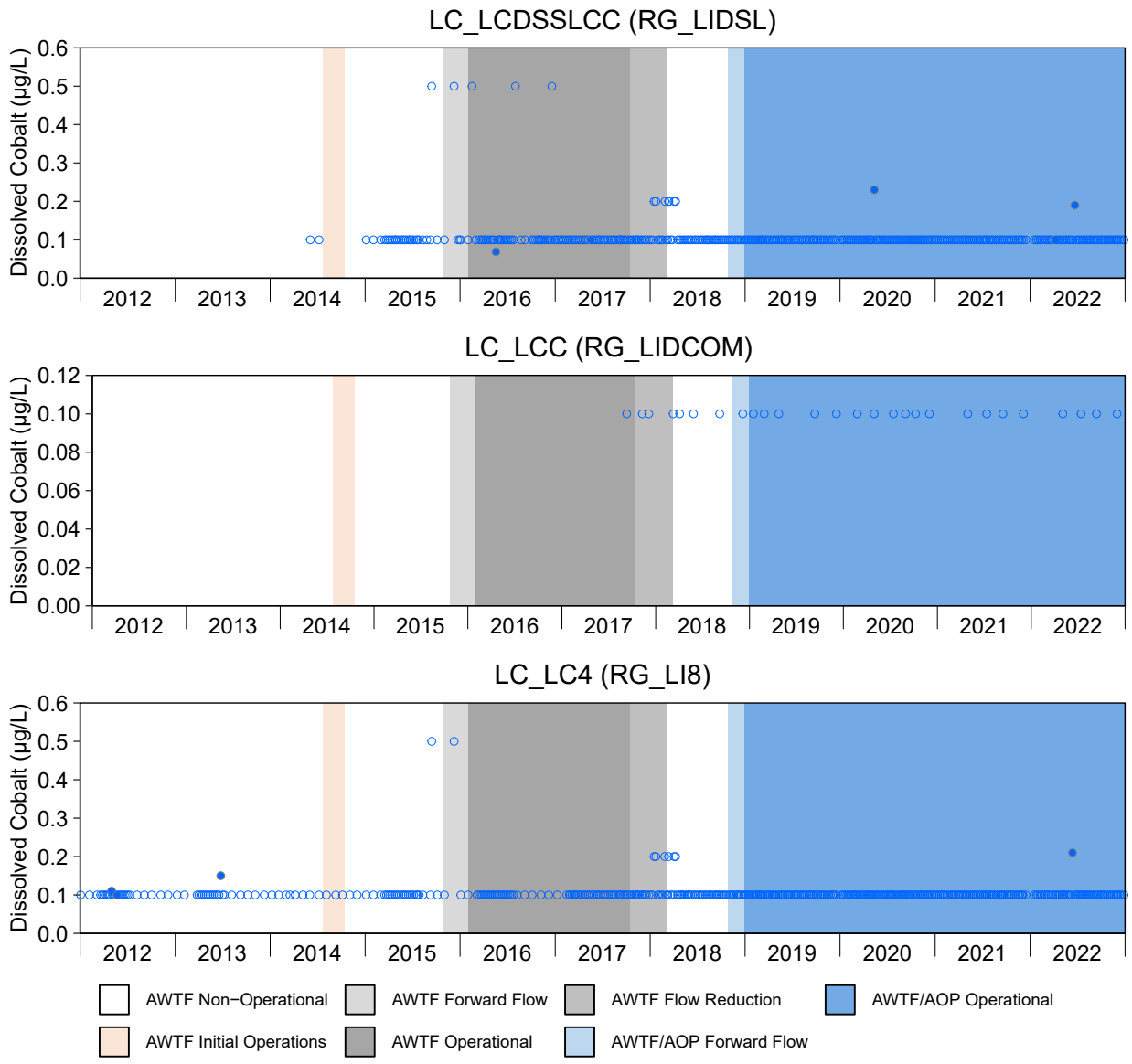


Figure E.8: Time Series Plots for Dissolved Cobalt Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Dissolved cobalt was used because bioavailability and toxicity has been associated with the dissolved fraction (Environment Canada 2017; Azimuth 2018). Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

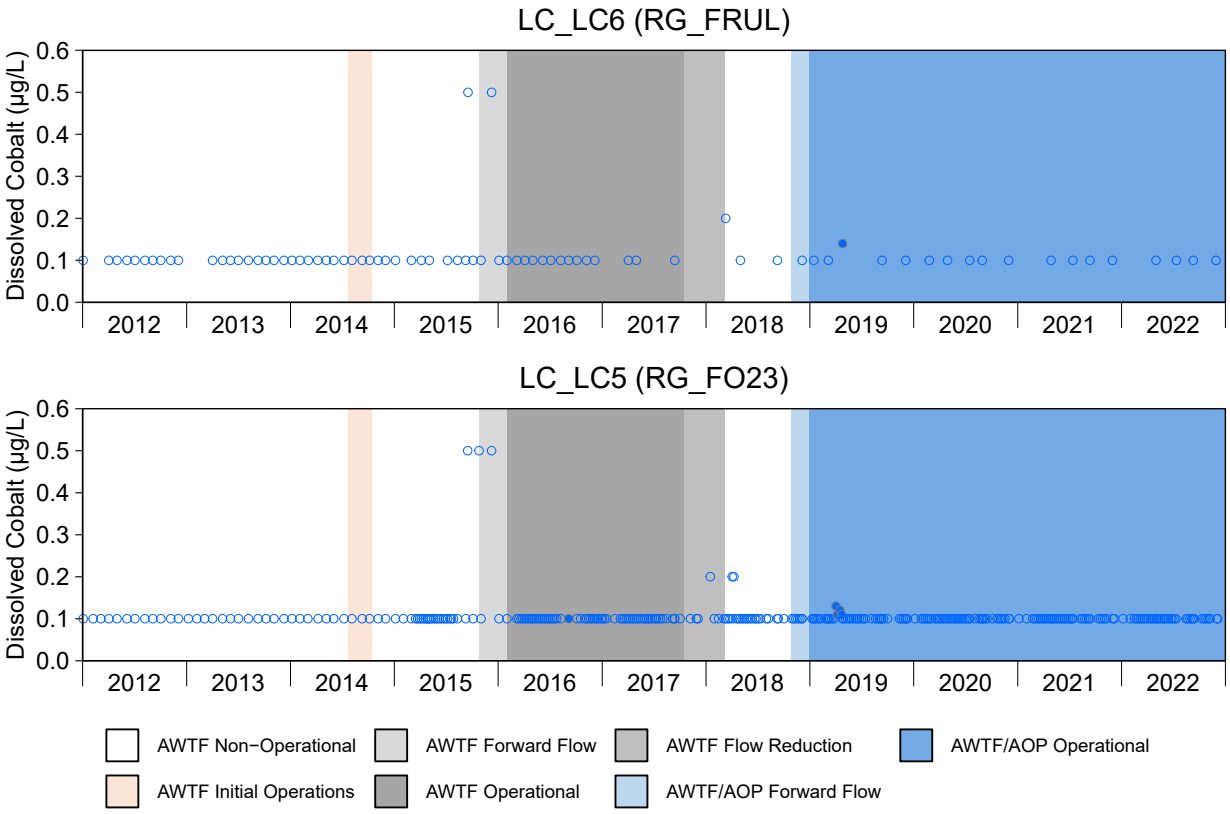


Figure E.8: Time Series Plots for Dissolved Cobalt Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Dissolved cobalt was used because bioavailability and toxicity has been associated with the dissolved fraction (Environment Canada 2017; Azimuth 2018). Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

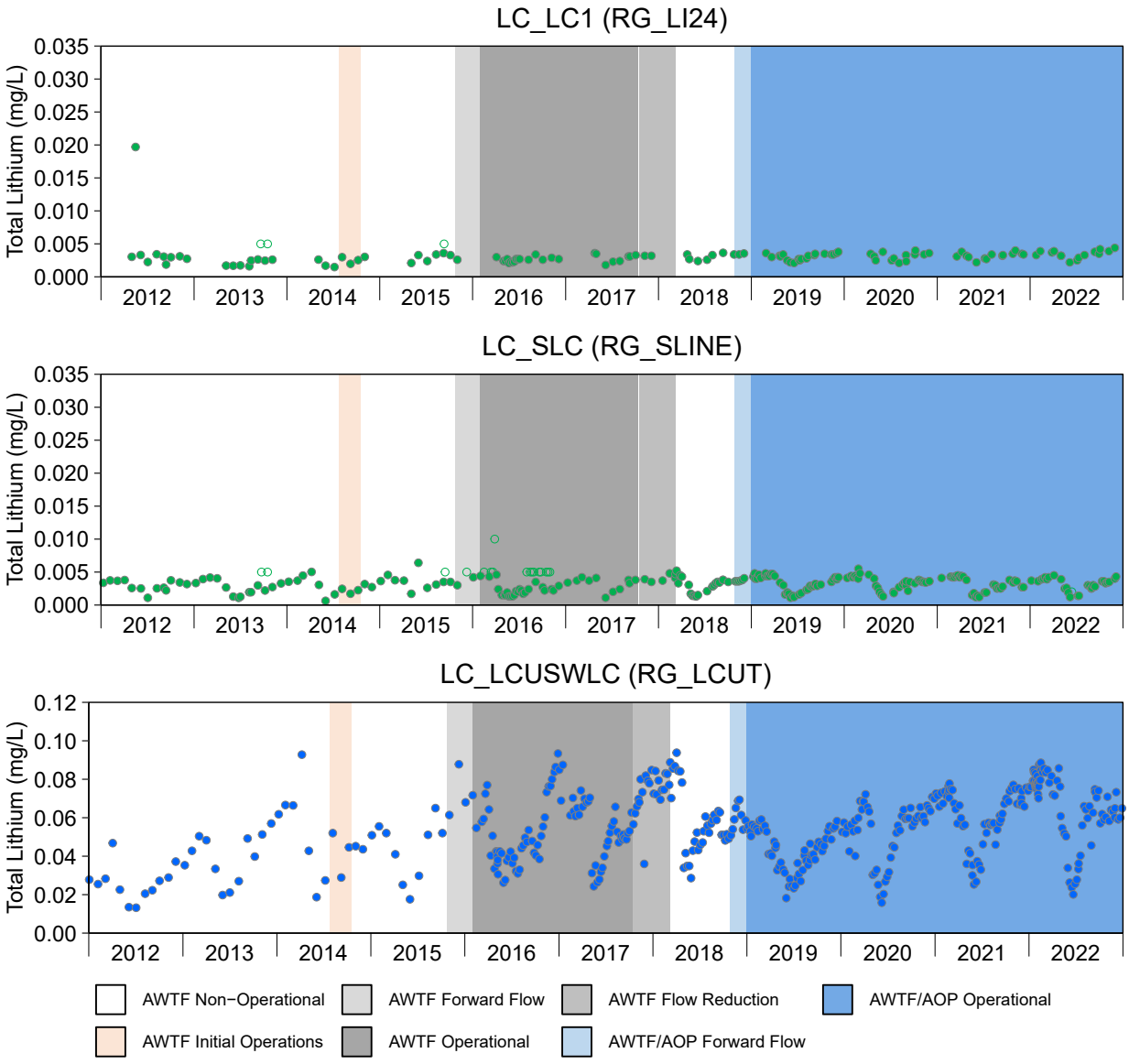


Figure E.9: Time Series Plots for Total Lithium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

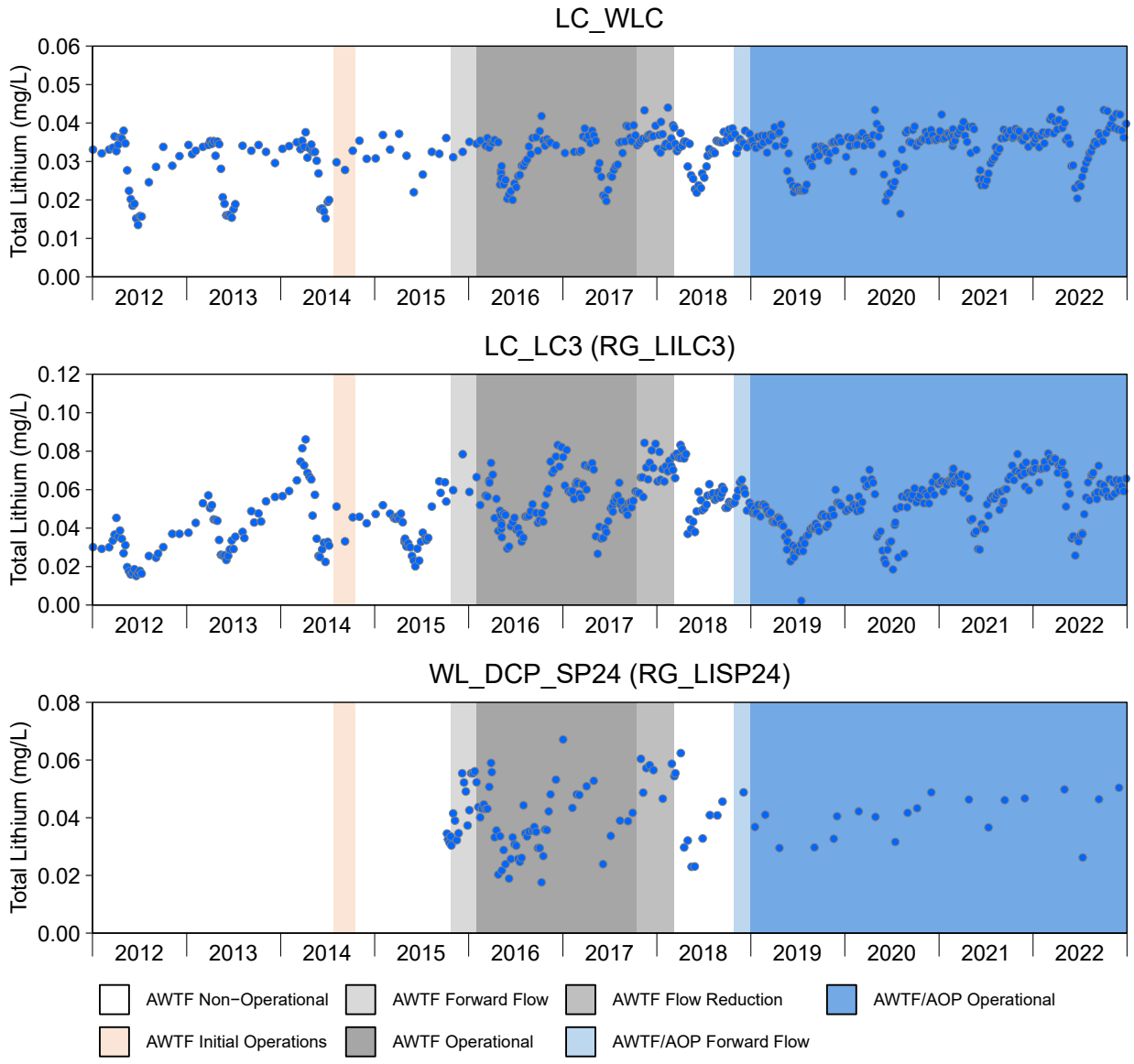


Figure E.9: Time Series Plots for Total Lithium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

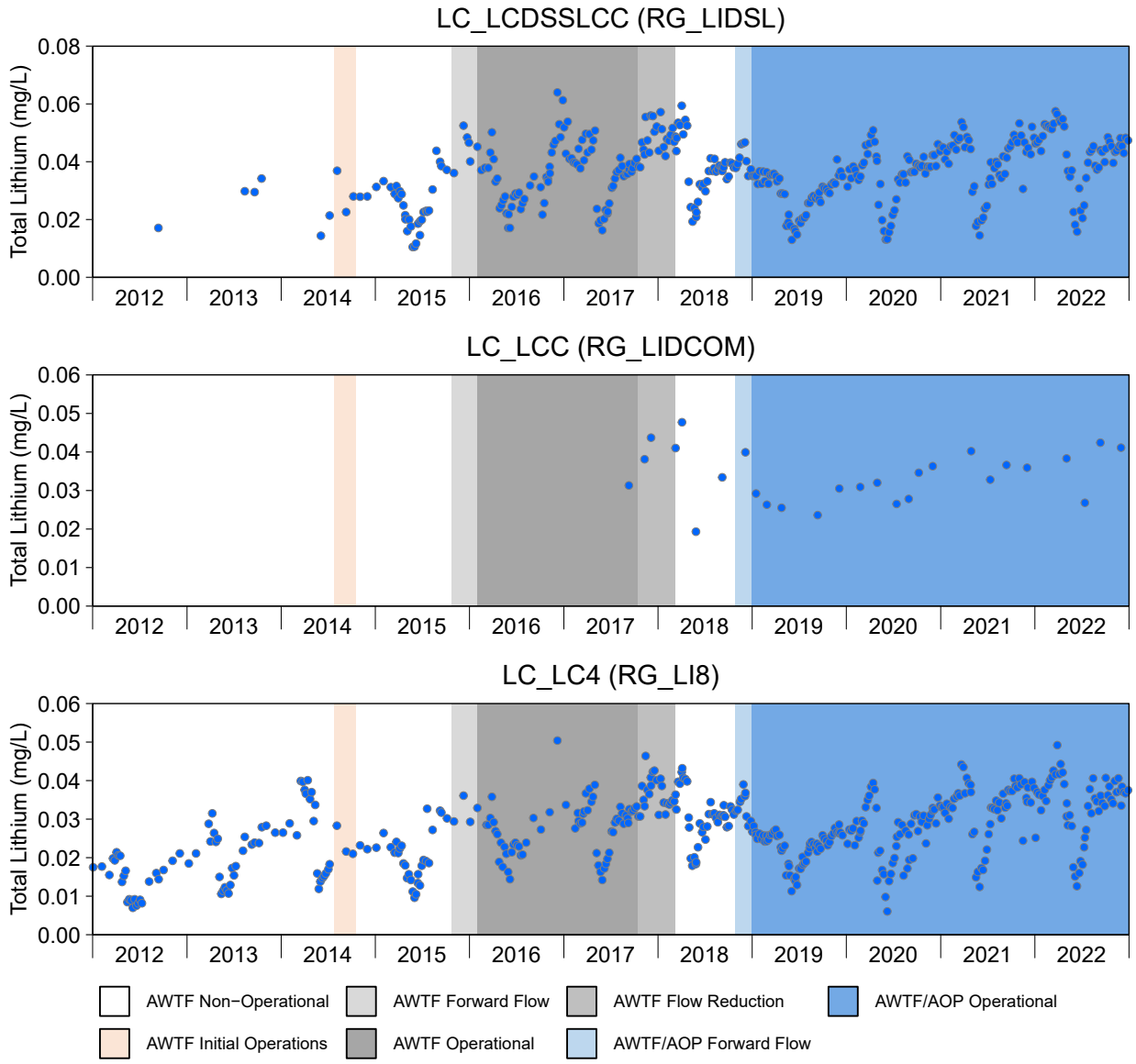


Figure E.9: Time Series Plots for Total Lithium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

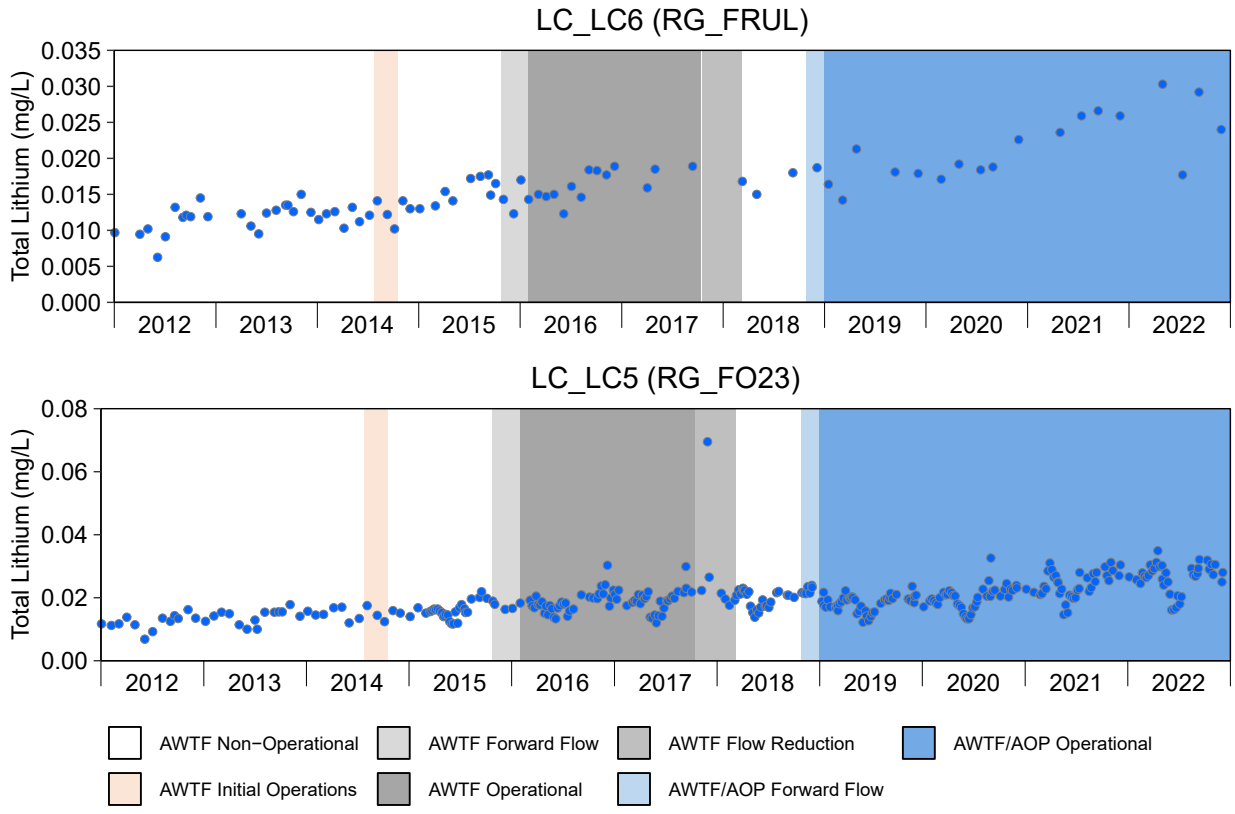


Figure E.9: Time Series Plots for Total Lithium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

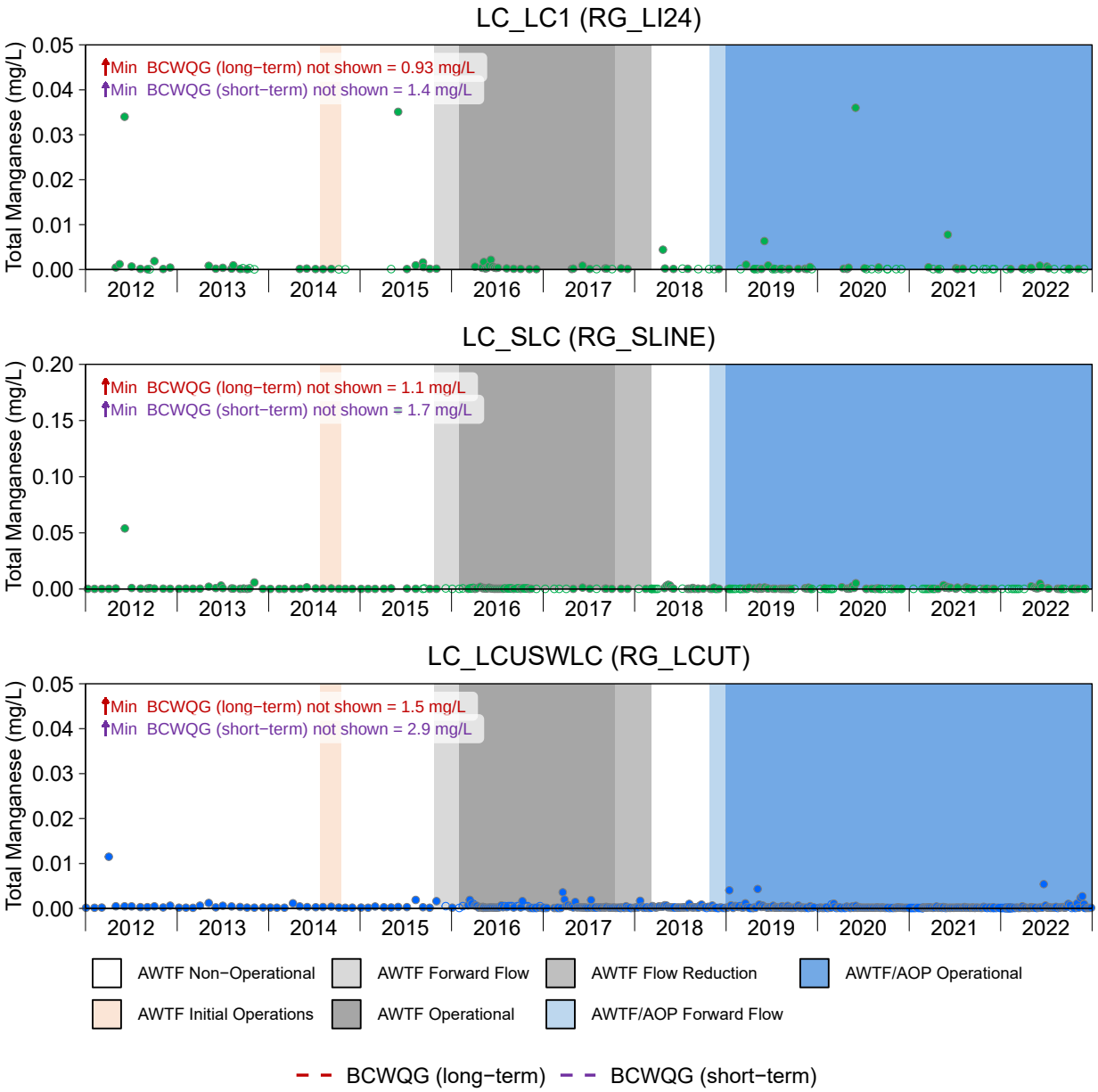


Figure E.10: Time Series Plots for Total Manganese Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

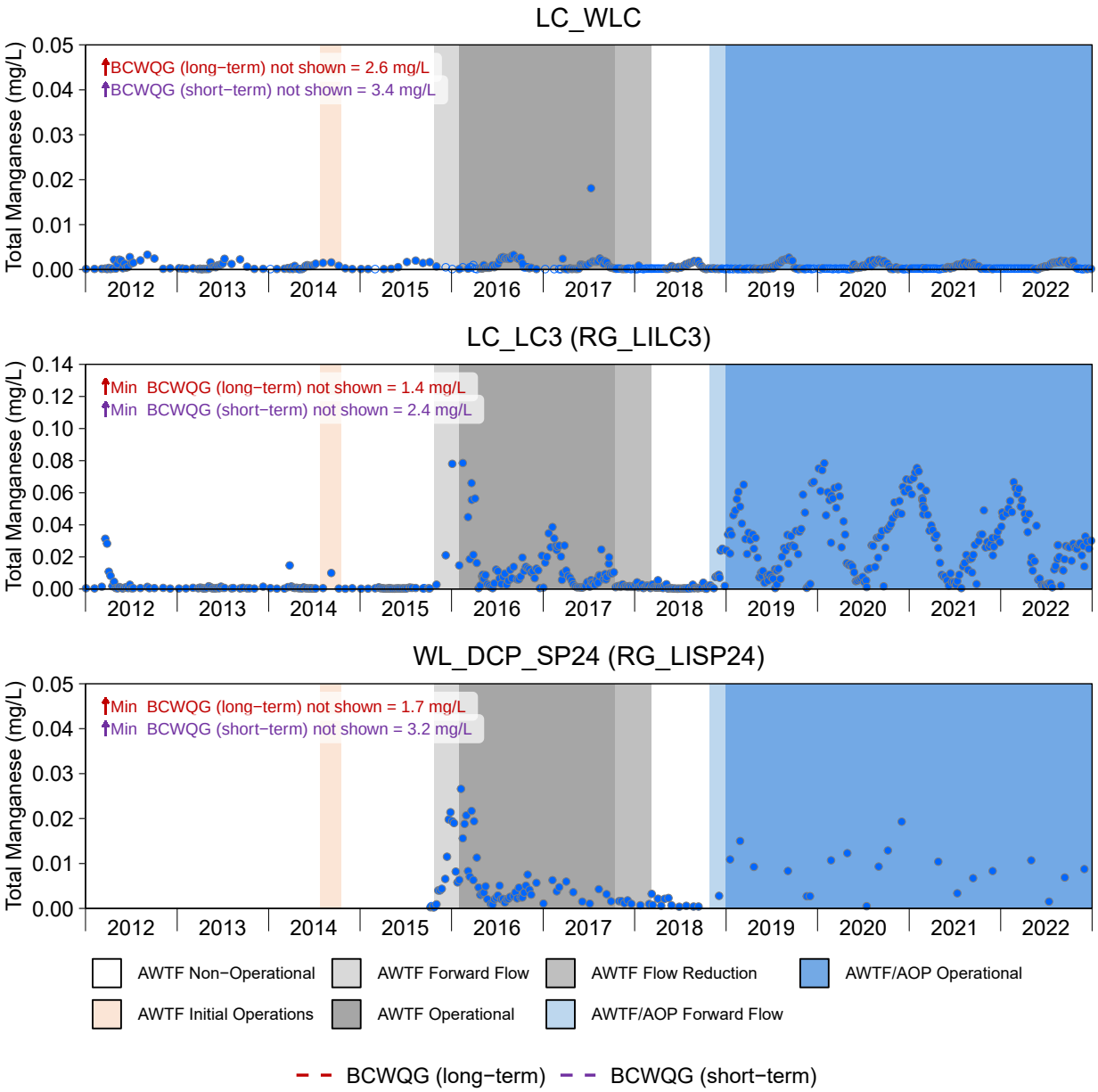


Figure E.10: Time Series Plots for Total Manganese Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

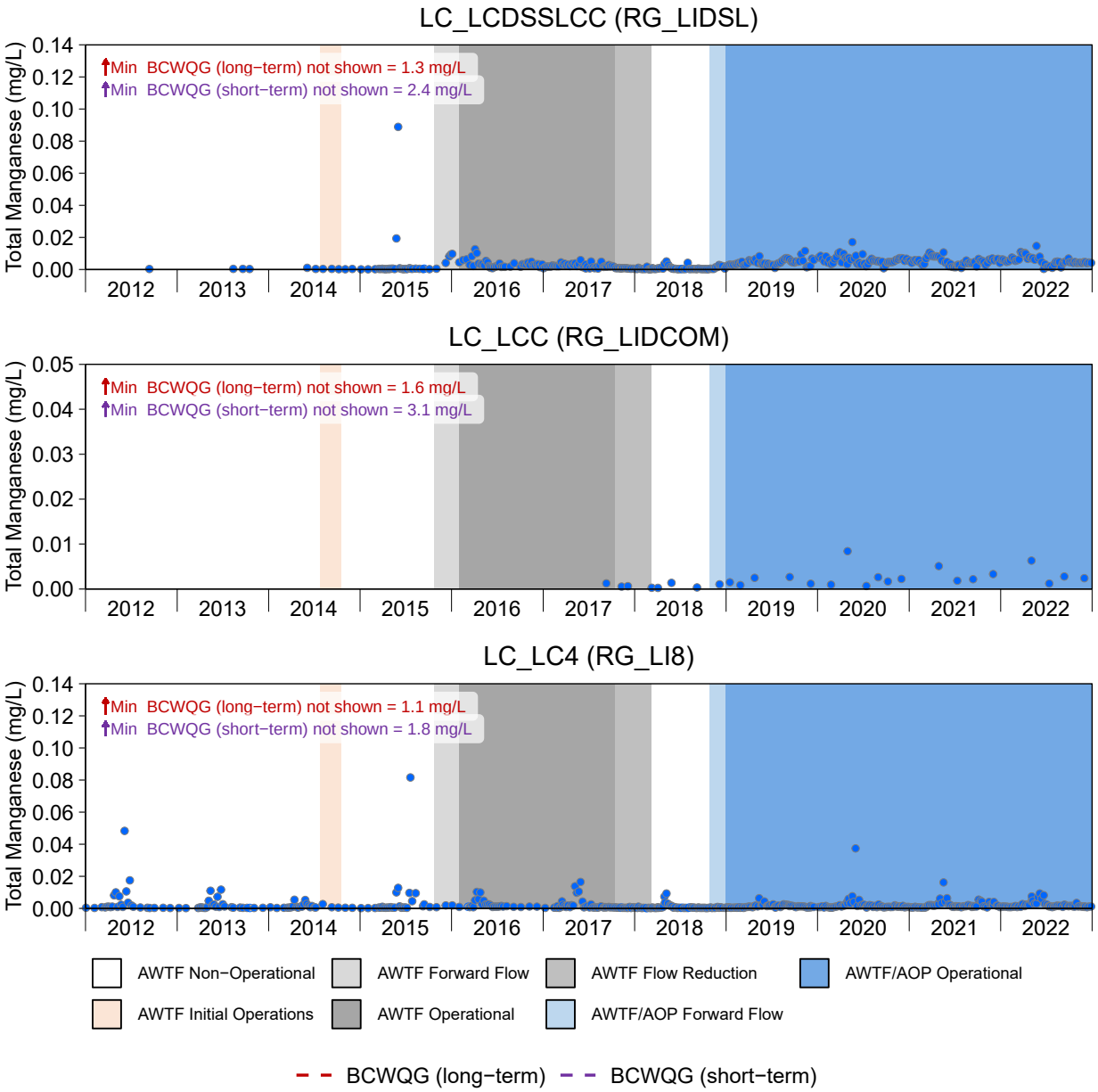


Figure E.10: Time Series Plots for Total Manganese Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

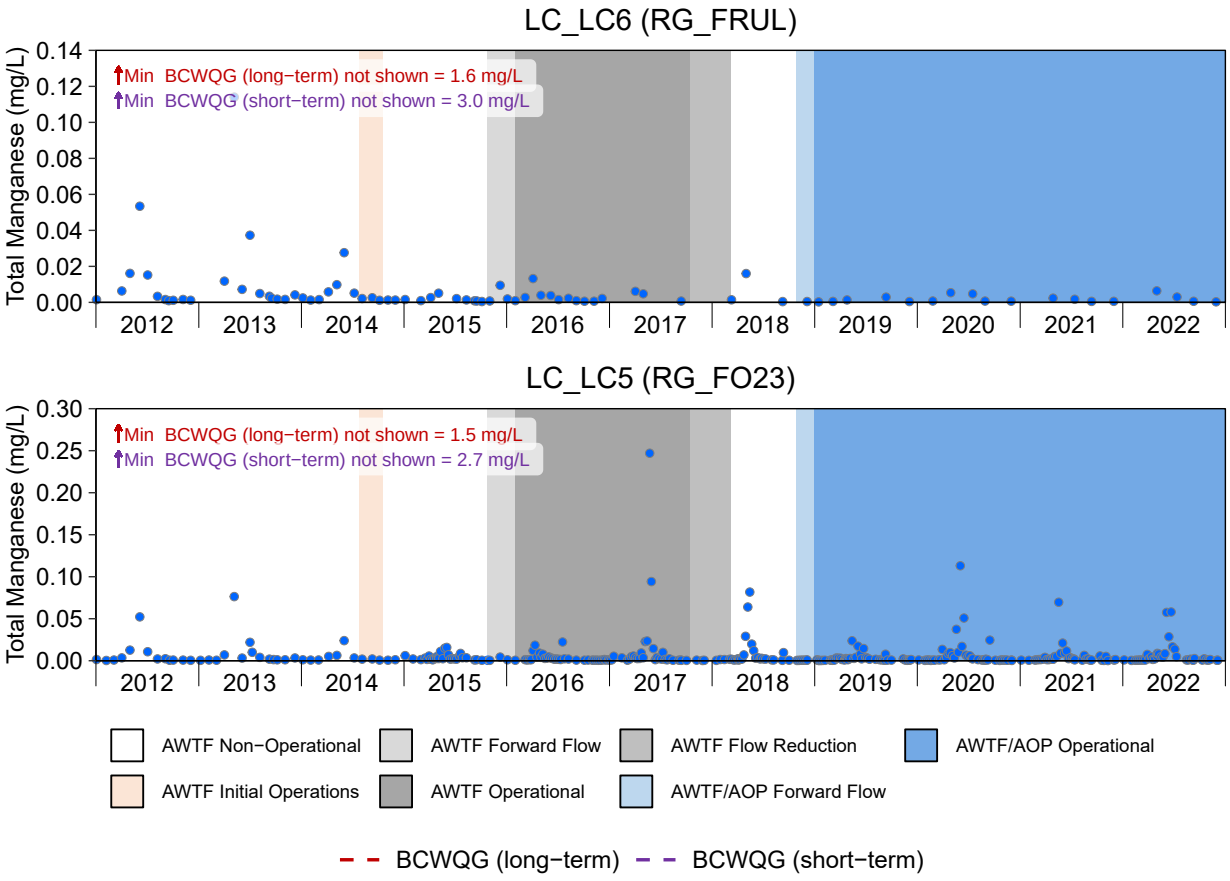


Figure E.10: Time Series Plots for Total Manganese Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

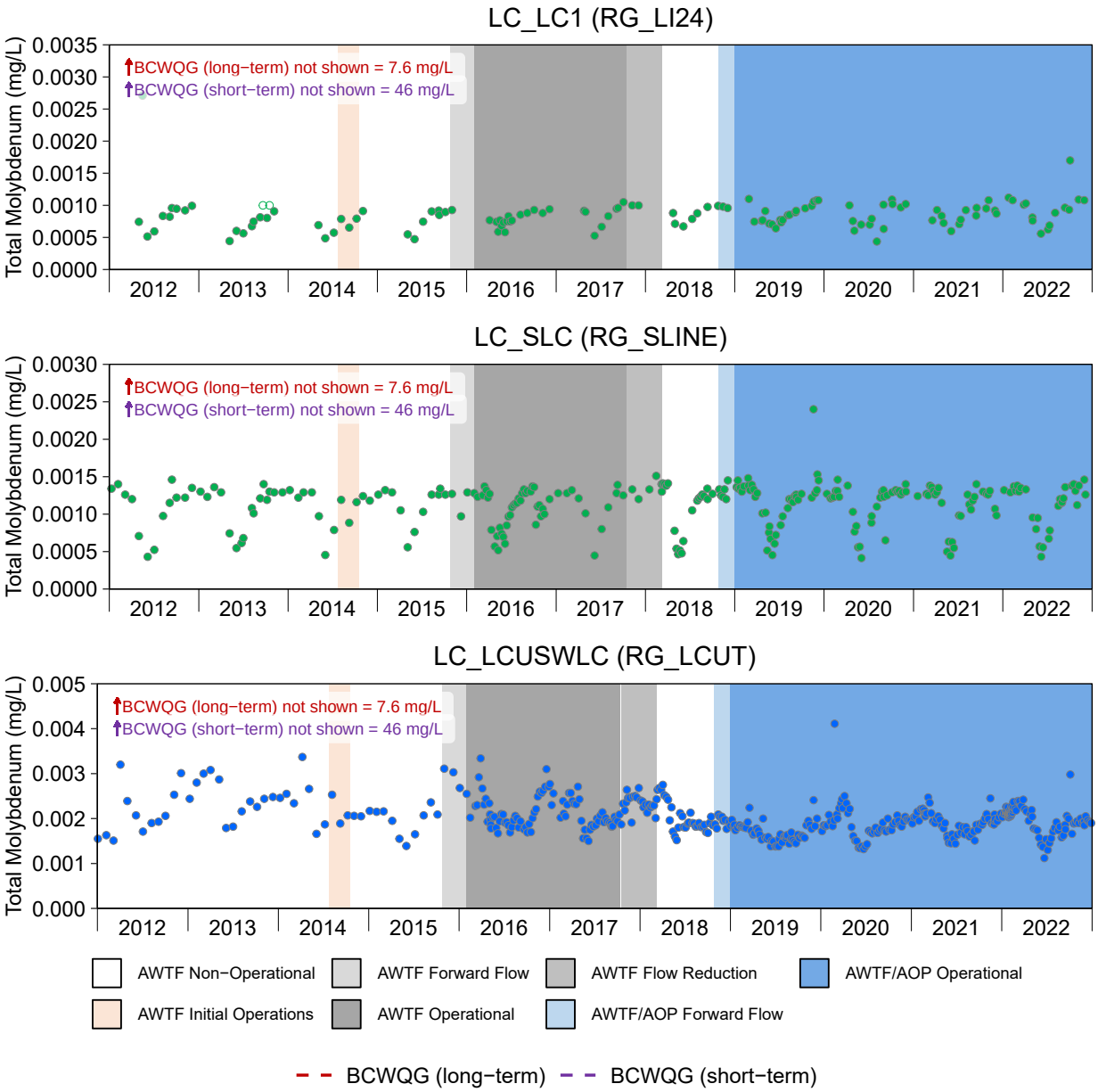


Figure E.11: Time Series Plots for Total Molybdenum Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

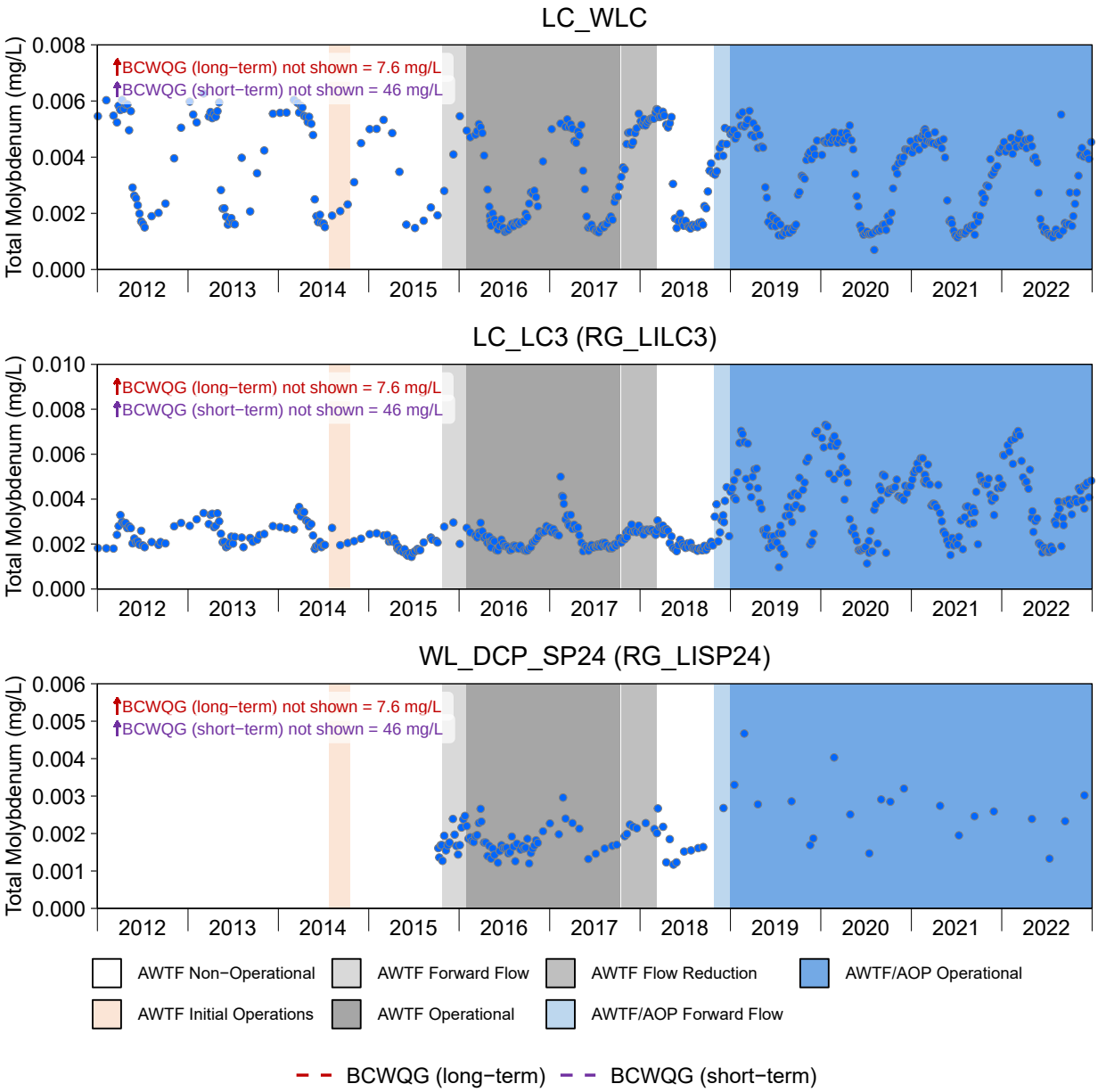


Figure E.11: Time Series Plots for Total Molybdenum Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

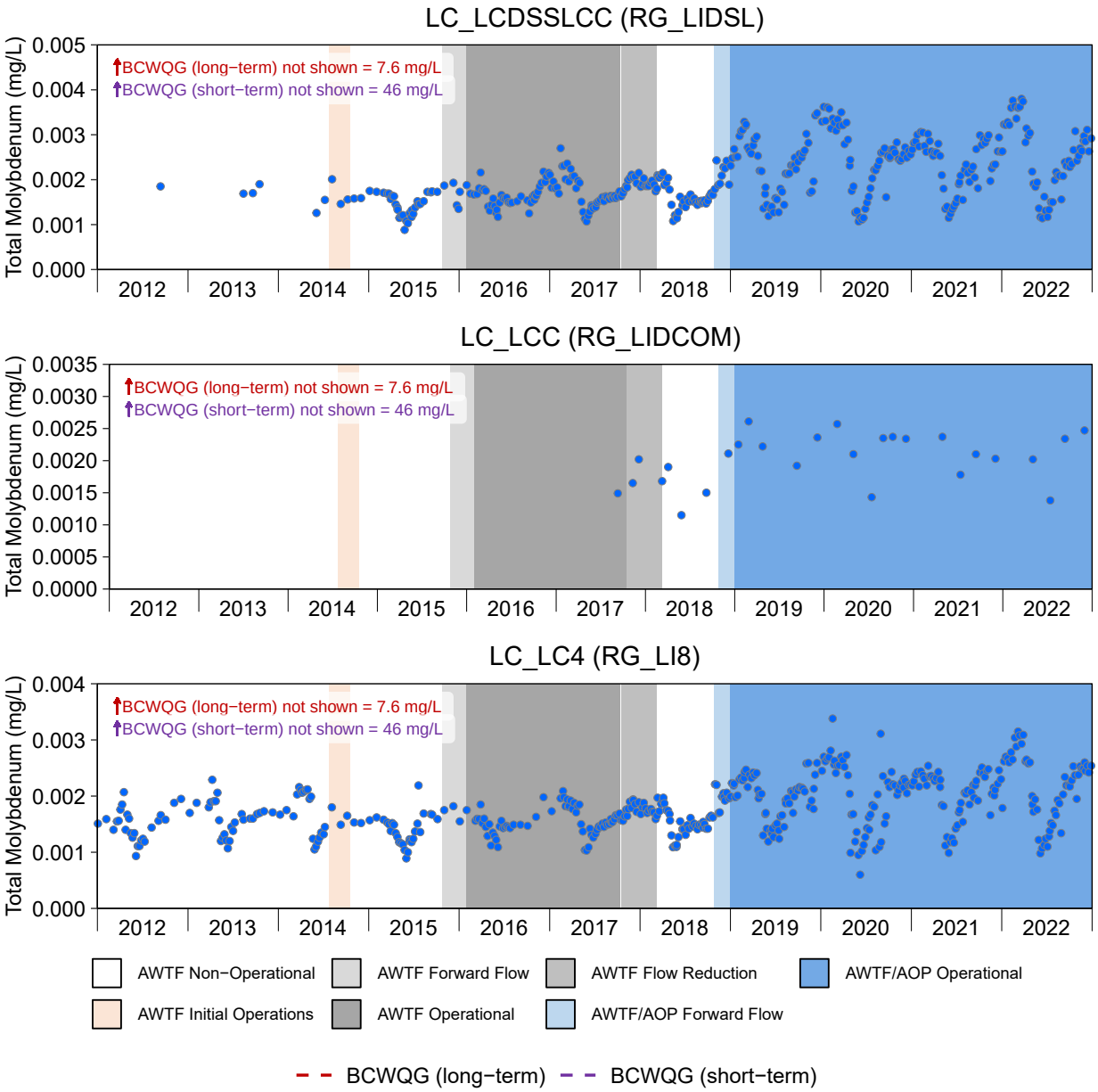


Figure E.11: Time Series Plots for Total Molybdenum Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

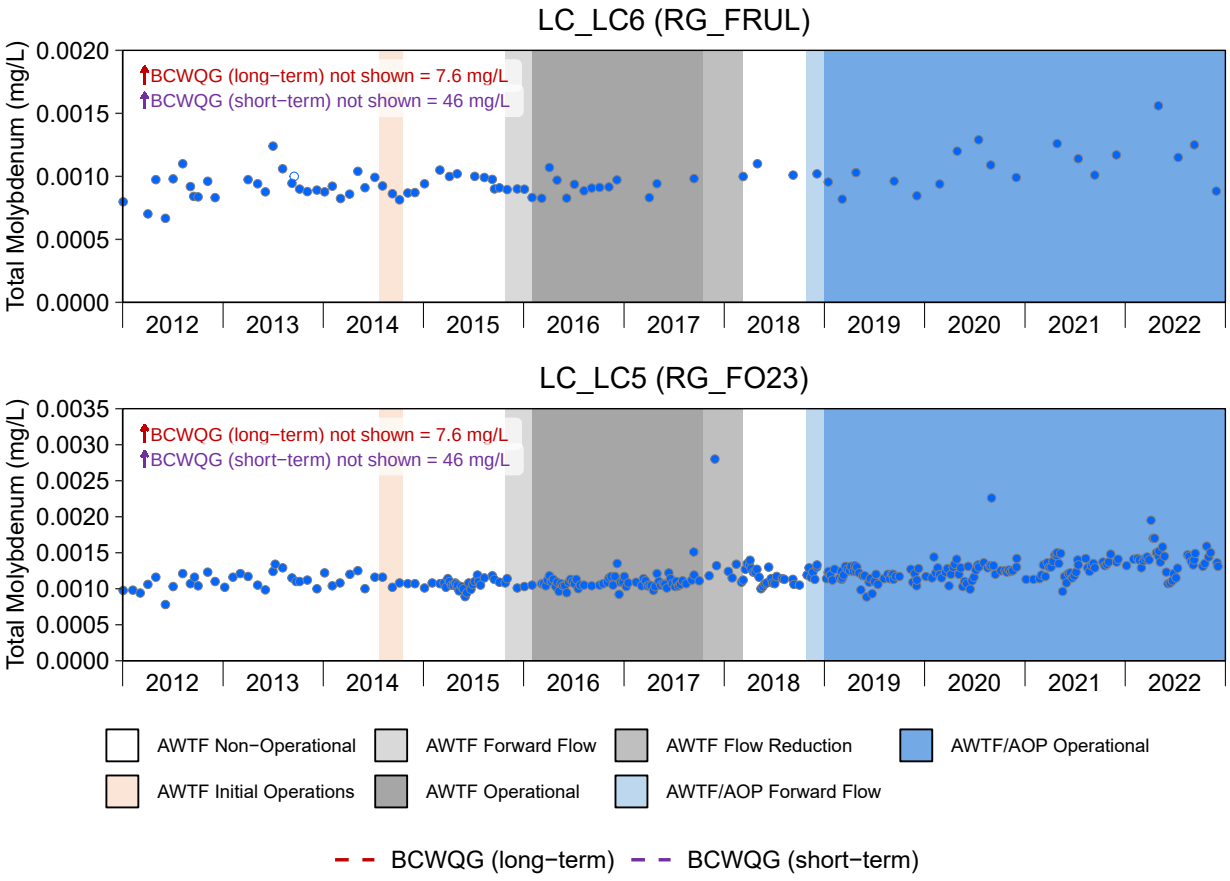


Figure E.11: Time Series Plots for Total Molybdenum Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

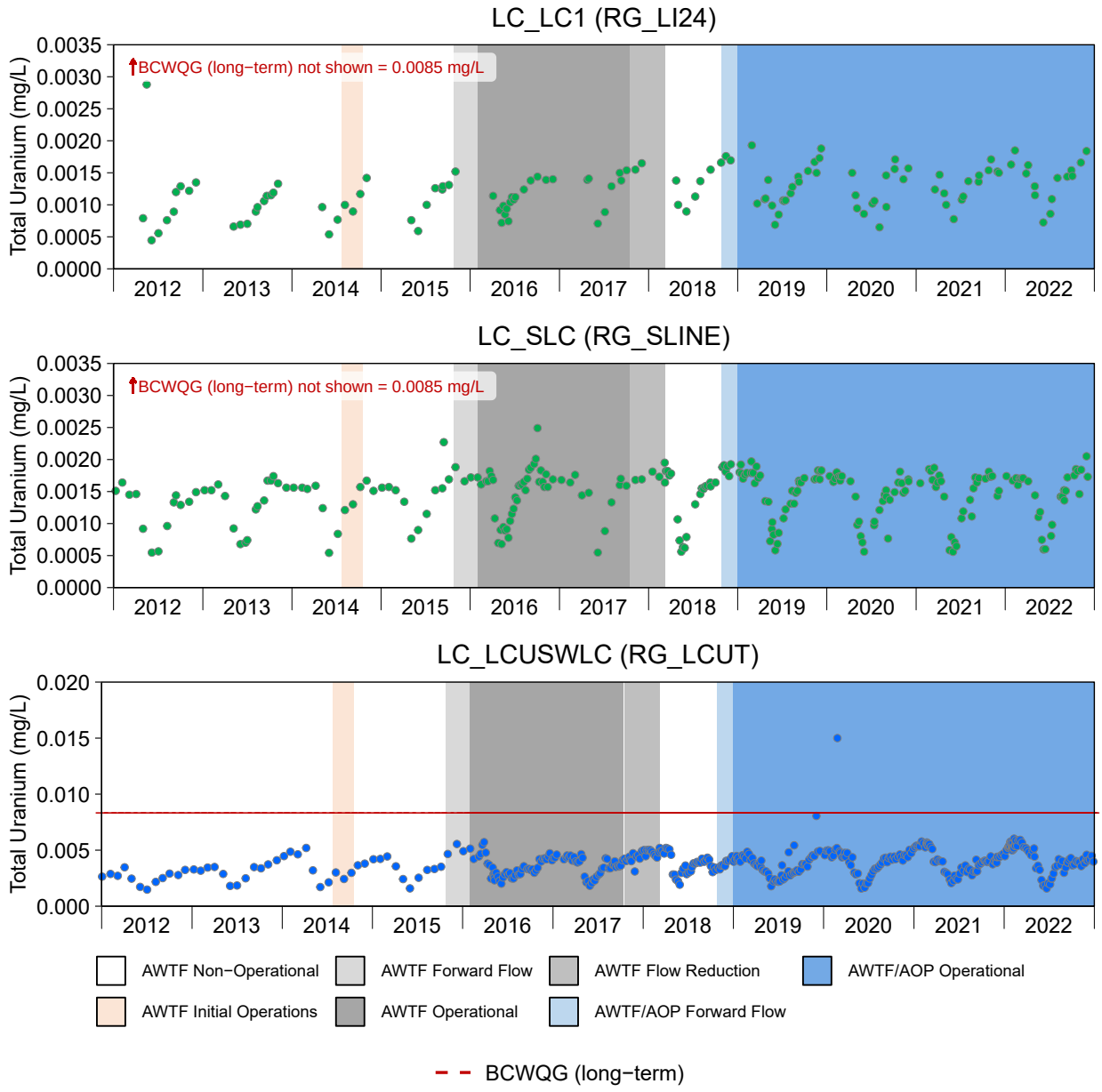


Figure E.12: Time Series Plots for Total Uranium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

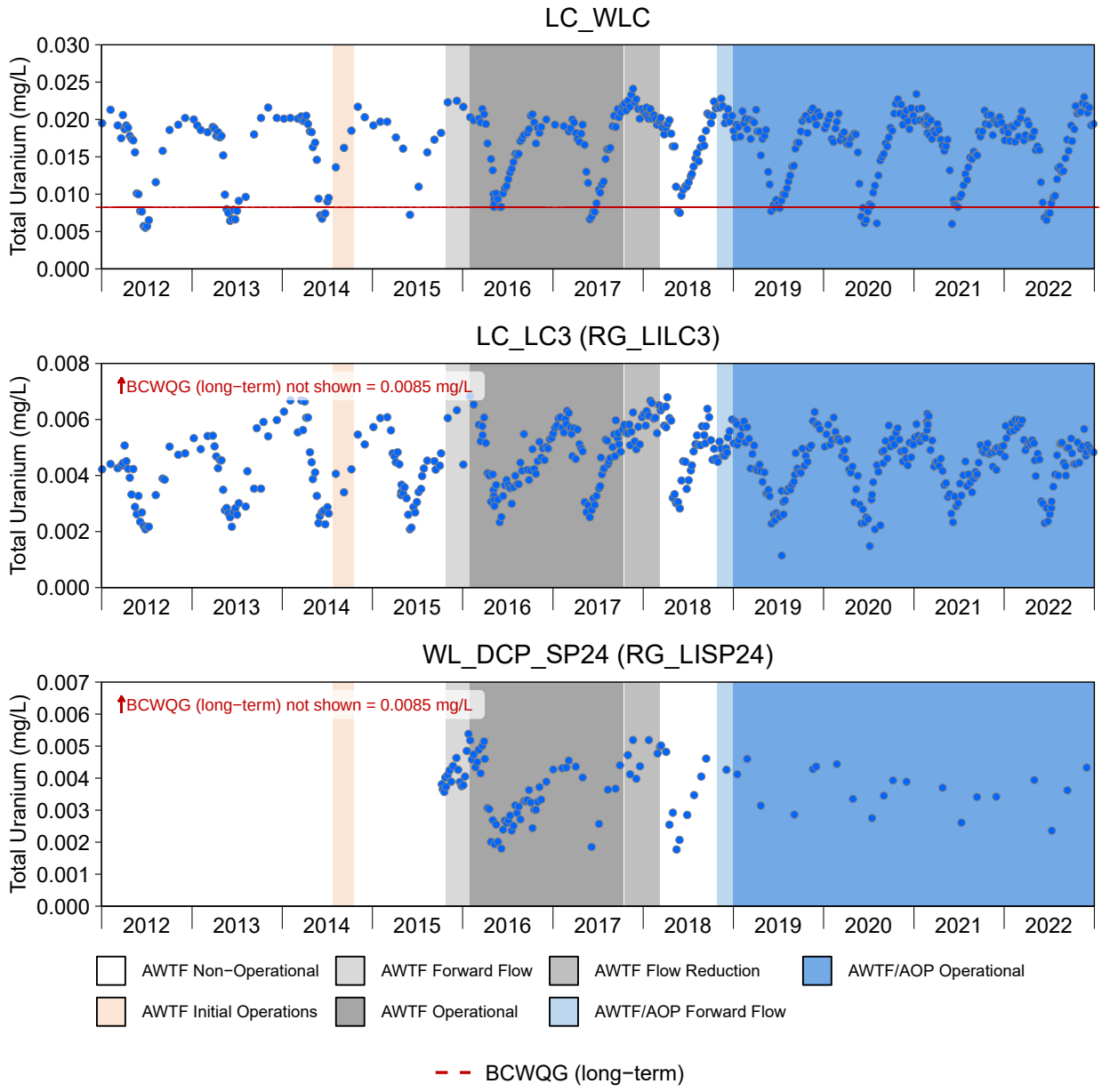


Figure E.12: Time Series Plots for Total Uranium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

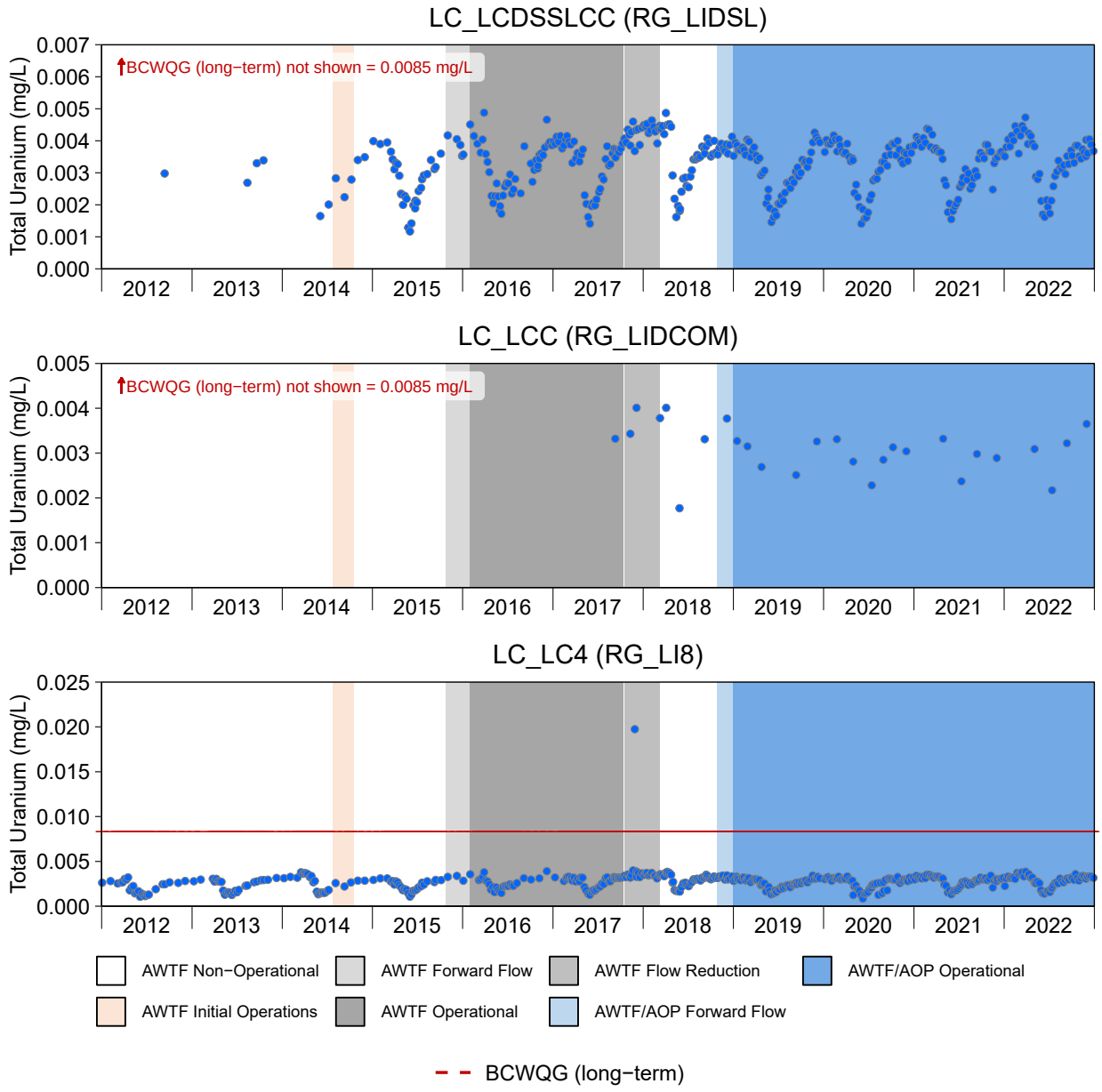


Figure E.12: Time Series Plots for Total Uranium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

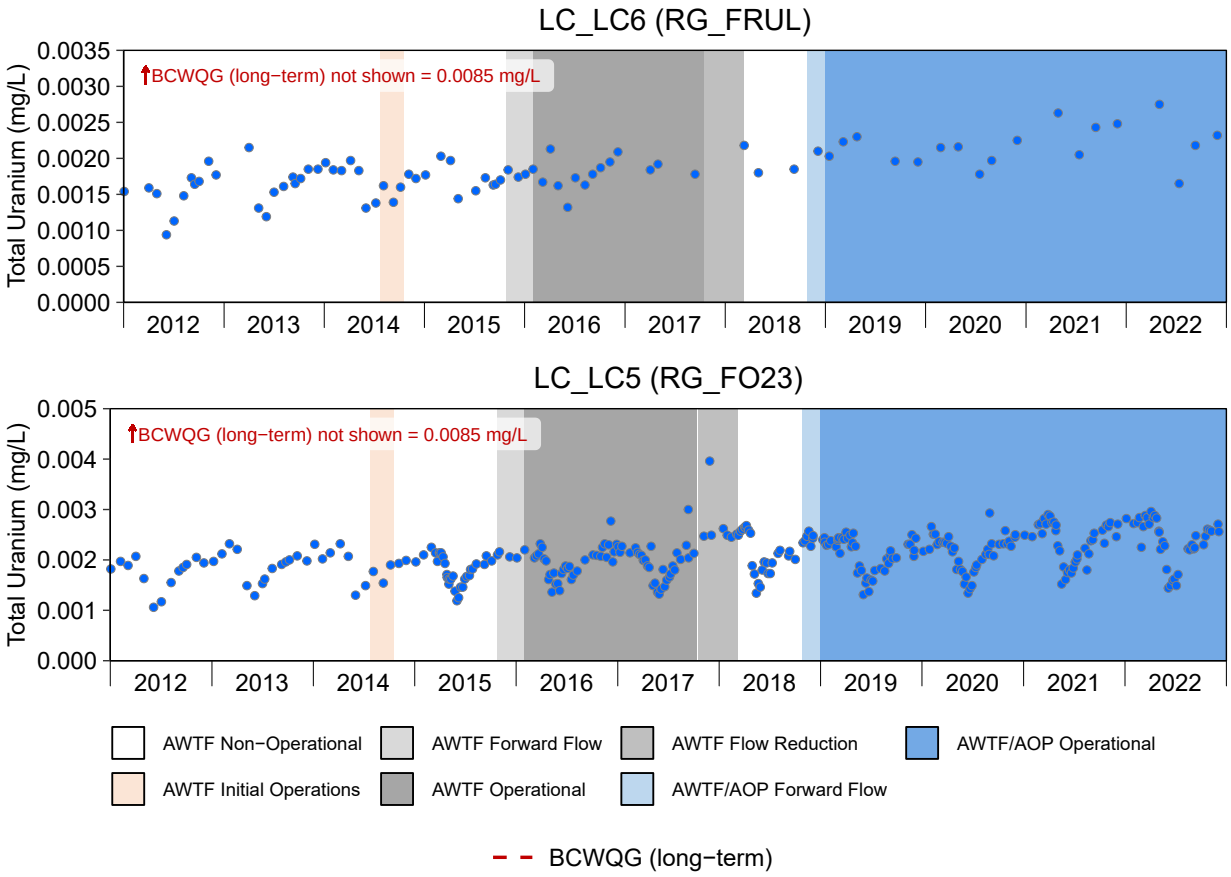


Figure E.12: Time Series Plots for Total Uranium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

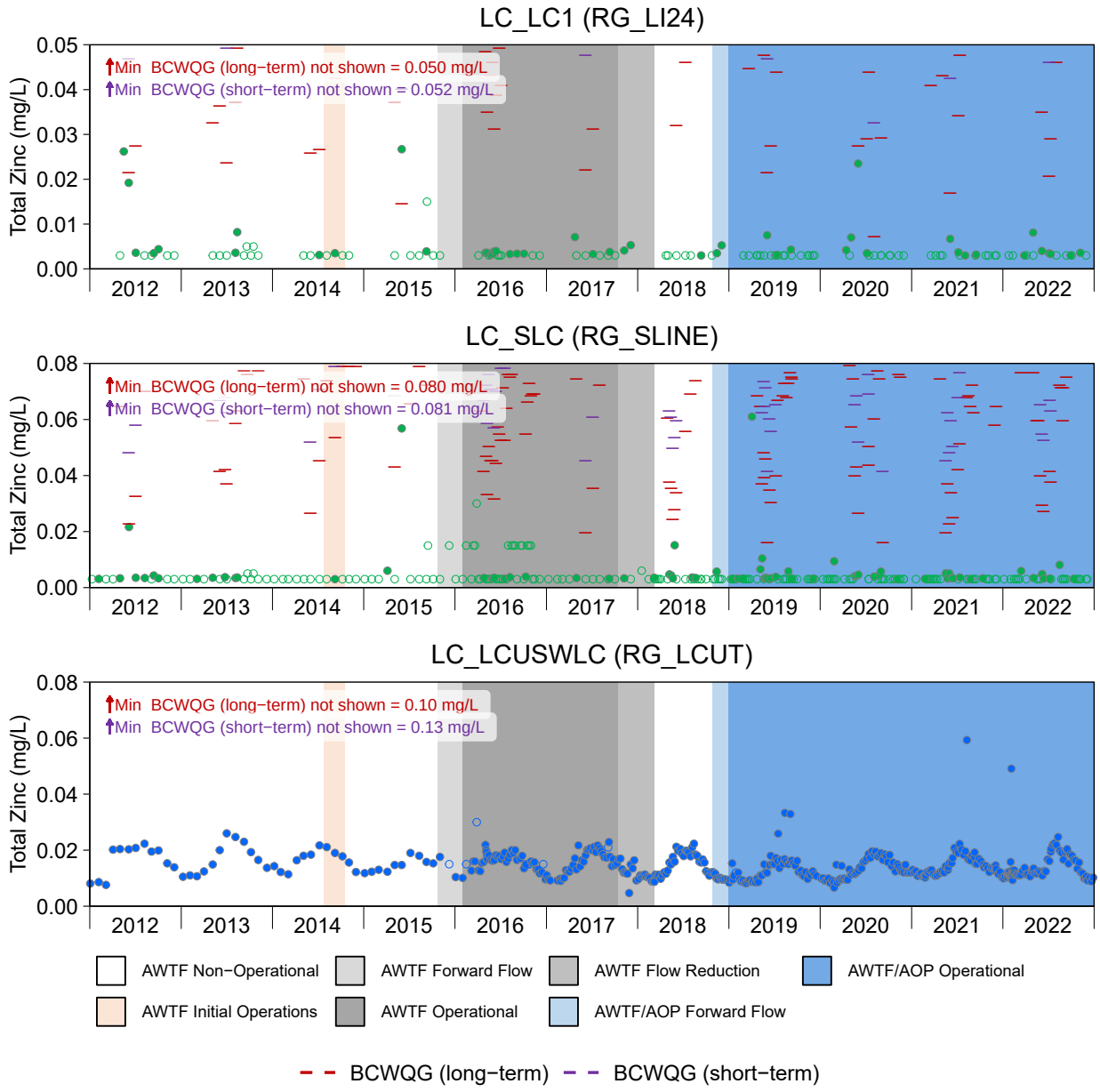


Figure E.13: Time Series Plots for Total Zinc Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

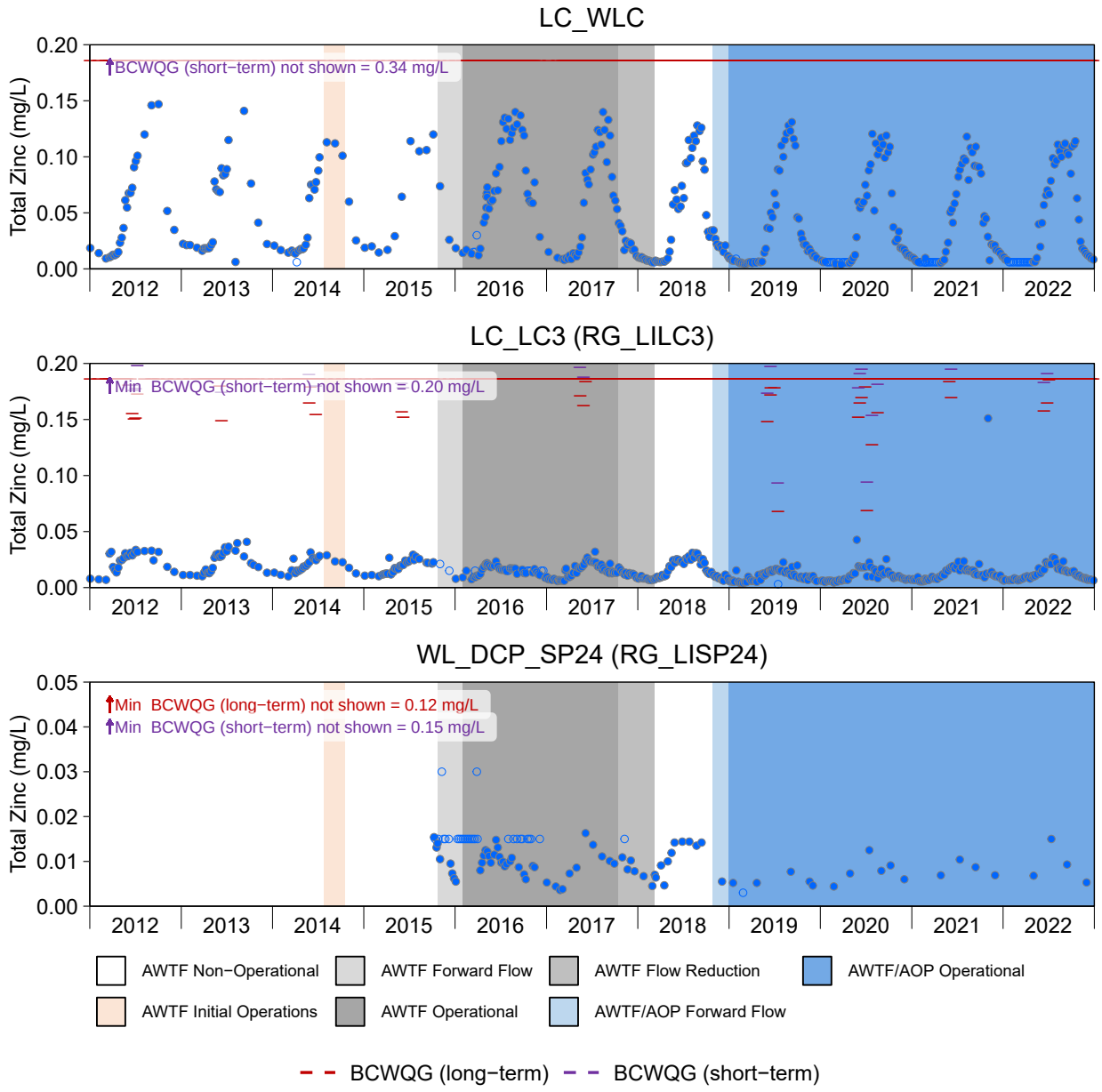


Figure E.13: Time Series Plots for Total Zinc Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

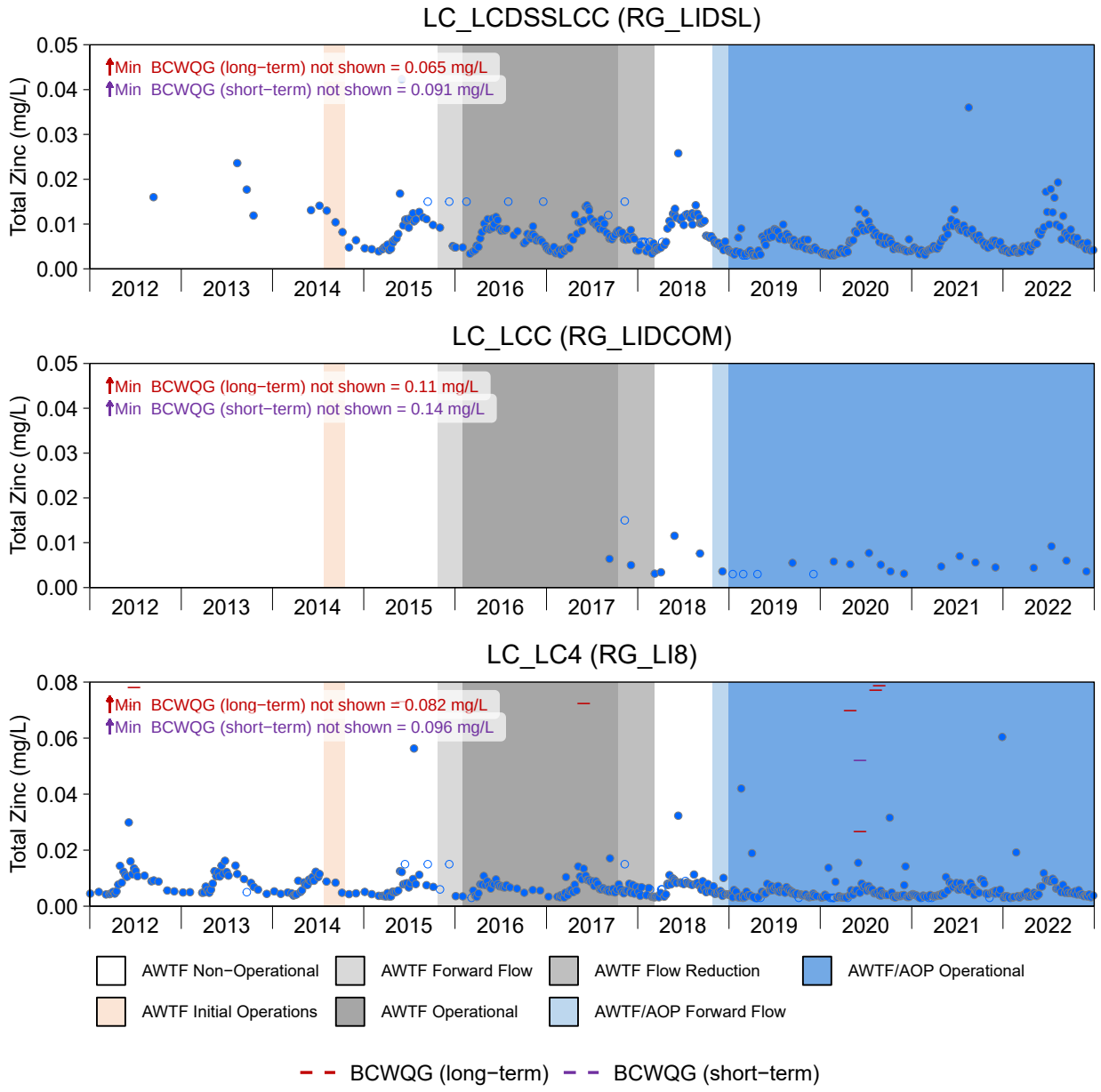


Figure E.13: Time Series Plots for Total Zinc Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

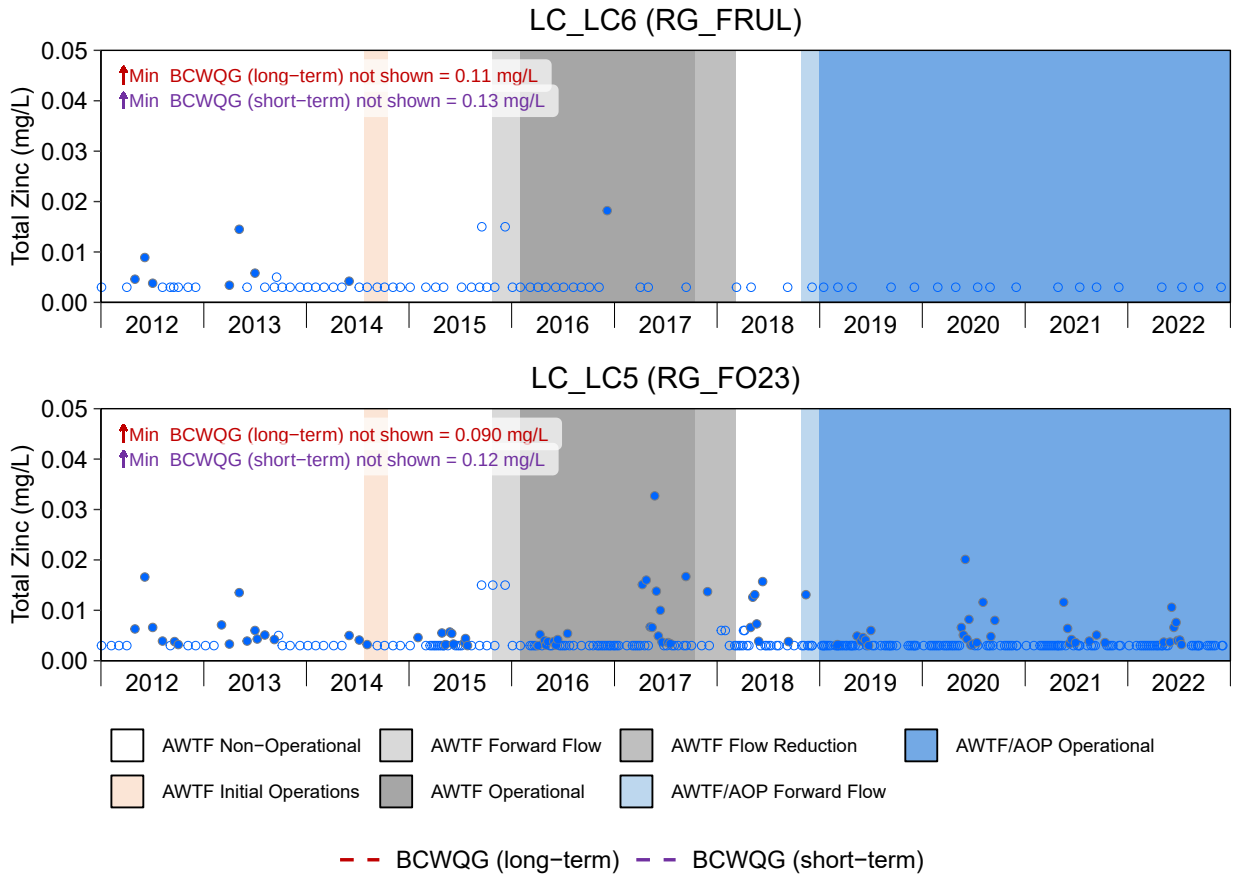


Figure E.13: Time Series Plots for Total Zinc Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

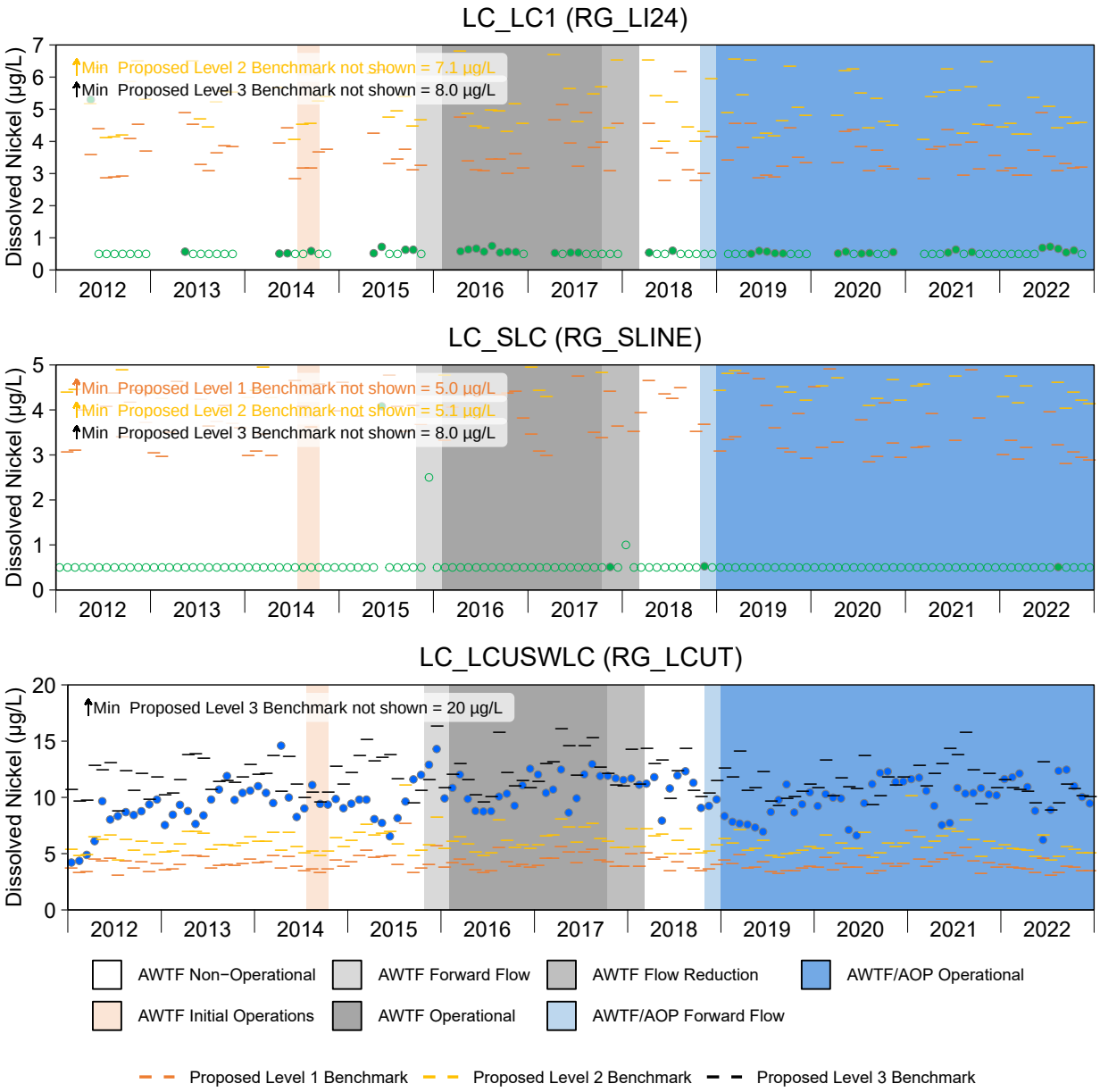


Figure E.14: Time Series Plots for Dissolved Nickel Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on dissolved organic carbon, water hardness and bicarbonate concentrations. Values and effects concentrations were averaged by month according to screening guidance. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

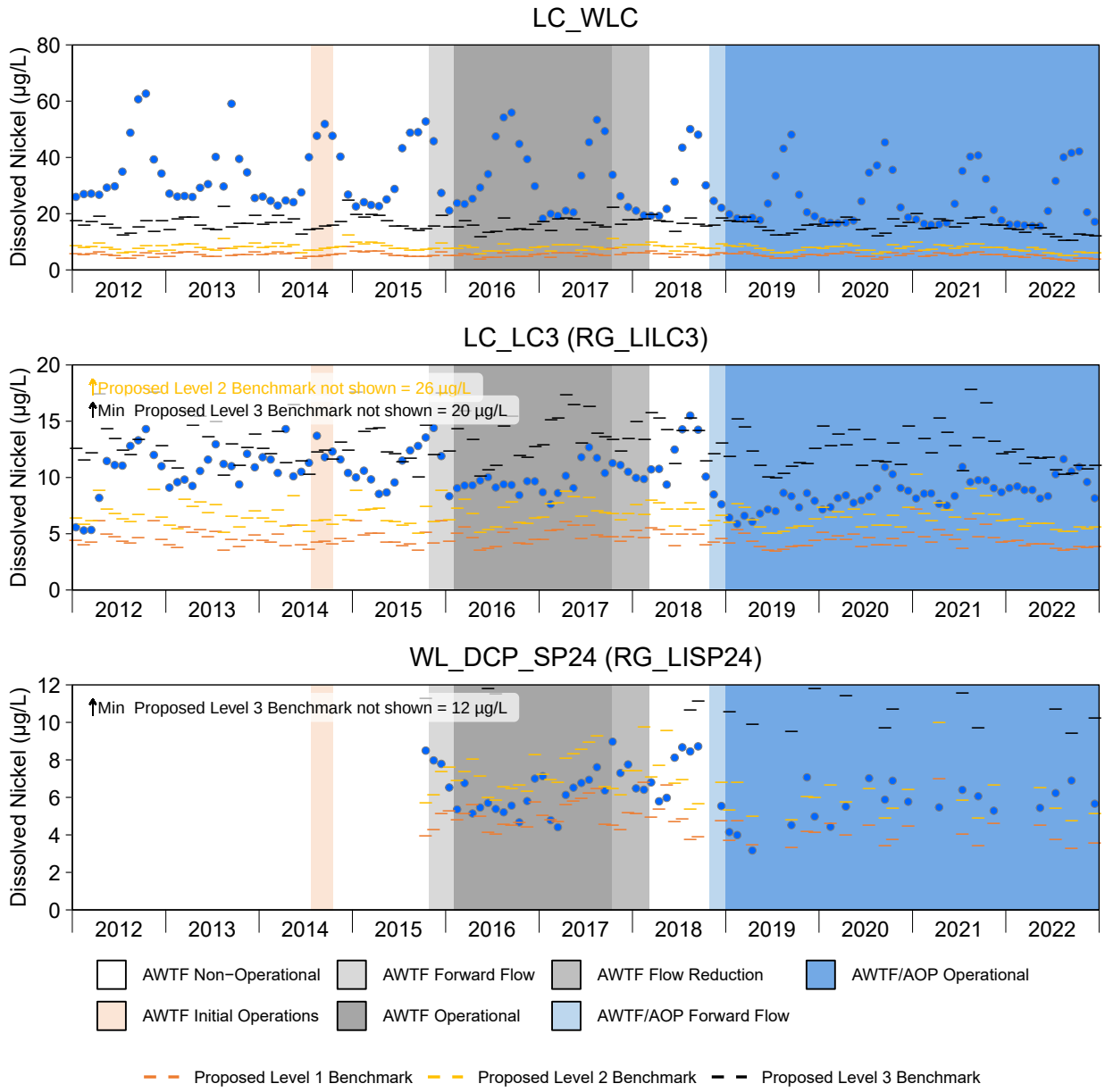
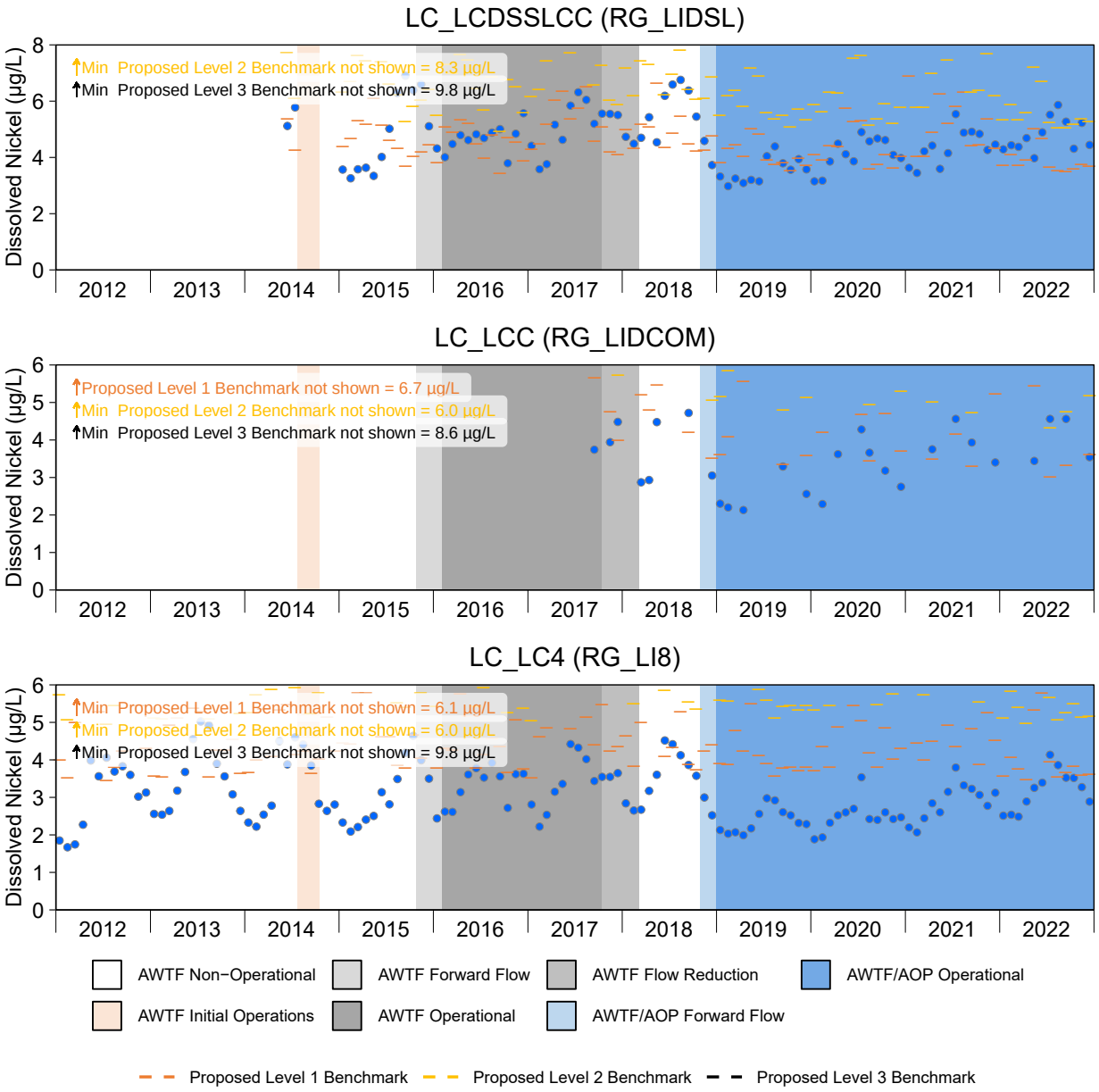


Figure E.14: Time Series Plots for Dissolved Nickel Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on dissolved organic carbon, water hardness and bicarbonate concentrations. Values and effects concentrations were averaged by month according to screening guidance. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.



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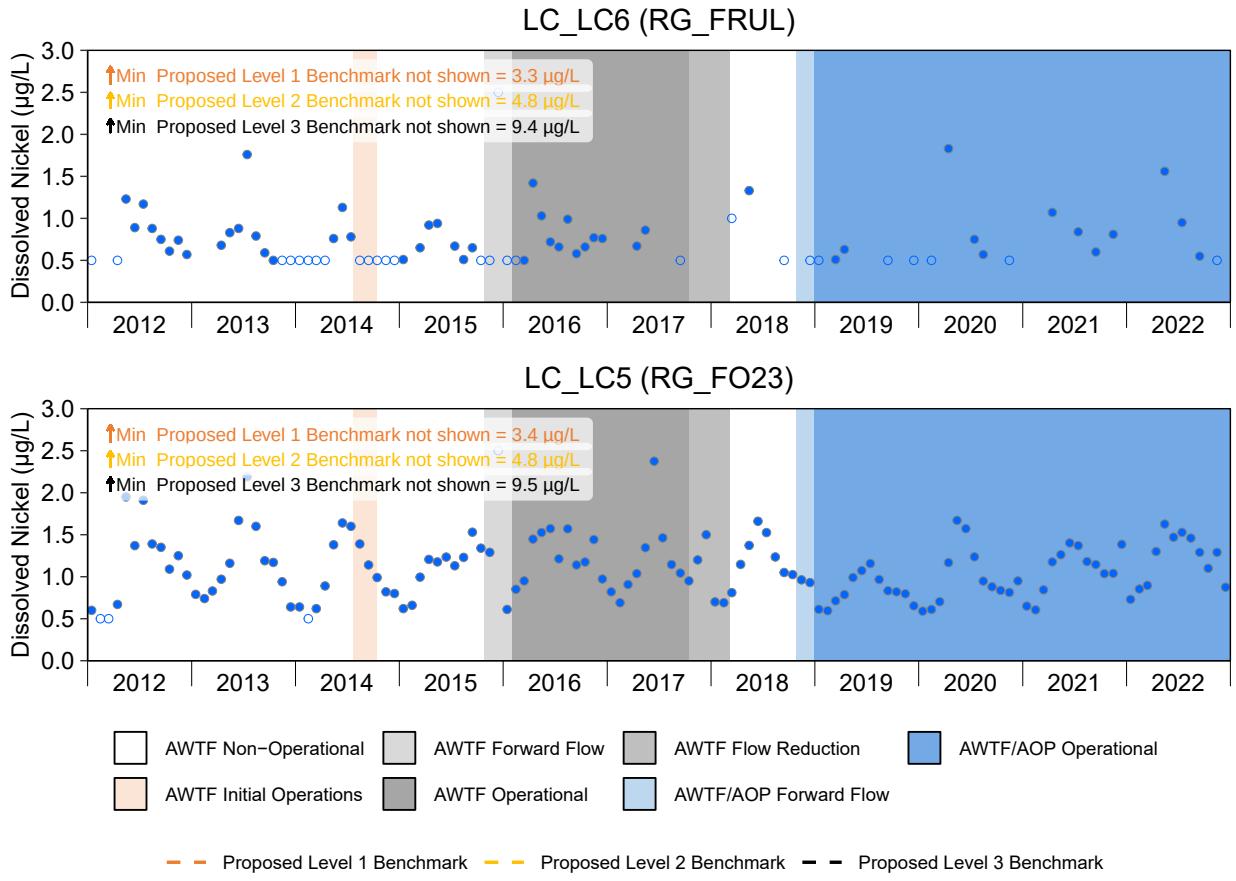
Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on dissolved organic carbon, water hardness and bicarbonate concentrations. Values and effects concentrations were averaged by month according to screening guidance. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.



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Notes: Green data points are used for reference sites and blue data points are used for mine−exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on dissolved organic carbon, water hardness and bicarbonate concentrations. Values and effects concentrations were averaged by month according to screening guidance. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Effluent from West Line Creek was diverted to the WLC AWTF when the AWTF was operational. Therefore, water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT during these operational periods. Water quality results from LC_LCUSWLC and RG_LCUT were combined during these periods for data interpretation. For periods when the AWTF was not operational, water quality results from LC_WLC and RG_LCUT were combined. Water quality at RG_LCUT has been monitored since Sept 2017.

Table E.1: British Columbia Water Quality Guidelines (BCWQG), Site-Specific Elk Valley Water Quality Plan (EVWQP) Benchmarks, and Interim Screening Values for Parameters Assessed in Line Creek LAEMP, 2022

Variable		Units	British Columbia Water Quality Guidelines[a]				Site-Specific Benchmark[b]
			Long-term Average	Short-term Maximum	Year	Status	
Non-Metals	Total Alkalinity	mg/L	For dissolved calcium = < 4mg/L, BCWQG = <10 For dissolved calcium = 4 to 8 mg/L, BCWQG = 10 to 20 For dissolved calcium = > 8 mg/L, BCWQG = > 20	-	2015	Working	-
	Unionized Ammonia[c]	mg/L	pH and Temperature dependent (tabular)	pH and Temperature dependent (tabular)	2009	Approved	-
	Chloride	mg/L	150	600	2003	Approved	-
	Fluoride	mg/L	-	For hardness ≤ 10 mg/L, BCWQG = 0.4 For hardness > 10 mg/L, BCWQG = [-51.73 + 92.57 × log10(hardness)]×0.01 Maximum applicable hardness = 385 mg/L	1990	Approved	-
	Nitrate-N	mg/L	3	33	2009	Approved	Updated Effects Concentrations: Level 1 = $10^{[(\log10(9)/(-2.64))-(1.45-1.18(\log10(\text{hardness})))]}$ Level 2 = $10^{[(\log10(4)/(-2.64))-(1.45-1.18(\log10(\text{hardness})))]}$ Level 3 = $10^{[(\log10(1)/(-2.64))-(1.45-1.18(\log10(\text{hardness})))]}$
	Nitrite-N[d]	mg/L	0.02 to 0.20	0.06 to 0.60	2009	Approved	-
	Dissolved oxygen[e]	mg/L	For buried embryo/alevin life stages, BCWQG (water column) = 11 BCWQG (interstitial) = 8; for other life stages, BCWQG (water column) = 8	For buried embryo/alevin life stages, BCWQG (water column) = 9 BCWQG (interstitial) = 6 For other life stages, BCWQG (water column) = 5	1997	Approved	-
	pH[f]	pH units	6.5 - 9.0		1991	Approved	-
	Sulphate[g]	mg/L	128 to 429 Maximum applicable hardness = 250 mg/L	-	2013	Approved	Updated Effects Concentrations: Level 1 = 617 Level 2 = 764 Level 3 = 1099
	Total Dissolved Solids	mg/L	-	-	-	-	Screening Level 1 Benchmark = 1,000
Metals and Metalloids	Aluminum	µg/L	Biotic Ligand Model	-	2023	Approved	-
	Antimony (III)	mg/L	0.009	-	2015	Working	-
	Arsenic	mg/L	-	0.005	2002	Approved	-
	Barium	mg/L	1	-	2015	Working	-
	Beryllium	mg/L	0.00013	-	2015	Working	-
	Boron	mg/L	1.2	-	2003	Approved	-
	Chromium[h]	mg/L	For Cr(VI), BCWQG = 0.001 For Cr(III), BCWQG = 0.0089	-	2015	Working	-
	Cobalt	µg/L	4	110	2004	Approved	-
	Iron	mg/L	-	1	2008	Approved	-
	Lead[g]	mg/L	For hardness ≤ 8 mg/L, none proposed For hardness 8 to 360 mg/L, BCWQG = 0.001×{3.31+ exp[1.273 × ln(hardness) - 4.704]} No more than 20% of samples in a 30-d period should be >1.5X the guideline. Maximum applicable hardness = 360 mg/L	For hardness ≤ 8 mg/L, BCWQG ≤ 0.003 For hardness 8 to 360 mg/L, BCWQG = 0.001×{exp[1.273 × ln(hardness) - 1.460]} Maximum applicable hardness = 360 mg/L	1987	Approved	-
	Manganese[g]	mg/L	For hardness 37 to 450 mg/L, BCWQG ≤ 0.004 × hardness + 0.605 Maximum applicable hardness = 450 mg/L	For hardness 25 to 259 mg/L, BCWQG ≤ 0.01102 × hardness + 0.54 Maximum applicable hardness = 259 mg/L	2001	Approved	-
	Mercury[i]	mg/L	MeHg ≤ 0.5% of THg, BCWQG = 0.00002 Else, BCWQG = [0.0001/(MeHg/THg)] OR When MeHg = 0.5% of THg, BCWQG= 0.00002 When MeHg = 1.0% of THg, BCWQG = 0.00001 When MeHg = 8.0% of THg, BCWQG= 0.00000125	-	2001	Approved	-
	Molybdenum	mg/L	7.6	46	2021	Approved	-
	Selenium	µg/L	2	-	2014	Approved	-
	Silver[f]	mg/L	For hardness ≤ 100 mg/L, BCWQG = 0.00005 For hardness > 100 mg/L, BCWQG = 0.0015	For hardness ≤ 100 mg/L, BCWQG = 0.0001 For hardness > 100 mg/L, BCWQG = 0.003	1996	Approved	-
	Thallium	mg/L	0.0008	-	1997	Working	-
	Uranium	mg/L	0.0085	-	2011	Working	-
	Zinc[g]	mg/L	For hardness ≤ 90 mg/L, BCWQG = 0.0075 For hardness 90 to 330 mg/L, CWQG = [7.5 + 0.75 (hardness - 90)]×0.001; Maximum applicable hardness = 330 mg/L	For hardness ≤ 90 mg/L, BCWQG = 0.033 For hardness 90 to 500 mg/L, BCWQG = [33 + 0.75 (hardness - 90)]×0.001; Maximum applicable hardness = 500 mg/L	1999	Approved	-

Note: "-" = no data available.

[a] British Columbia Working (BCMOECCS 2021a) or Accepted (BCMOECCS 2021b) Water Quality Guidelines for the Protection of Aquatic Life. For guidelines dependent on other analytes (e.g., hardness), guidelines were screened using concurrent values.

[b] When appropriate, site-specific Elk Valley Water Quality Plan Benchmarks (EVWQP; Teck 2014) or interim screening values were applied in addition to or instead of BC water quality guidelines. Interim screening values are displayed for nickel (Golder 2017b). Updated effects concentrations are displated for sulphate and nitrate (Golder, 2022).

[c] Temperature and pH dependent; range of minimum and maximum values.

[d] Dependent on concurrent chloride, range of values reported (BCMOECCS 2021b).

[e] Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

[f] Unrestricted change permitted within this pH range.

[g] For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness. If hardness values is lower than the minimum hardness, then guidelines were determined using the minimum hardness.

[h] Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

[i] The most conservative guideline (0.00000125 mg/L) was applied.

Table E.1: British Columbia Water Quality Guidelines (BCWQG), Site-Specific Elk Valley Water Quality Plan (EVWQP) Benchmarks, and Interim Screening Values for Parameters Assessed in Line Creek LAEMP, 2022

Variable			Units	British Columbia Water Quality Guidelines[a]				Site-Specific Benchmark[b]
				Long-term Average	Short-term Maximum	Year	Status	
Metals and Metalloids	Dissolved	Cadmium[g]	µg/L	For hardness = 3.4 to 285 mg/L, BCWQG = {exp[0.736×ln(hardness) - 4.943]} Maximum applicable hardness = 285 mg/L	For hardness = 7 to 455 mg/L, BCWQG = {exp[1.03×ln(hardness)-5.274]} Maximum applicable hardness = 455 mg/L	2015	Approved	Level 1 EVWQP Benchmark = $10^{0.83(\log(\text{hardness}))-2.53}$ Maximum applicable hardness = 285 mg/L
		Copper	mg/L	Biotic Ligand Model	Biotic Ligand Model	2019	Approved	-
		Iron	mg/L	-	BCWQG = 0.35 mg/L	2008	Approved	-
		Nickel	mg/L	-	-	2023	Proposed	Proposed Level 1 Benchmark = log(Benchmark) = 0.547 x (log(DOC)) + 0.411 x (log(Hardness)) - 0.520 x (log(Bicarbonate)) + 0.856 Proposed Level 2 Benchmark = log(Benchmark) = 0.547 x (log(DOC)) + 0.411 x (log(Hardness)) - 0.520 x (log(Bicarbonate))) + 1.011 Proposed Level 3 Benchmark = log(Benchmark) = 0.547 x (log(DOC)) + 0.411 x (log(Hardness)) - 0.520 x (log(Bicarbonate)) + 1.304

Note: "-" = no data available.

[a] British Columbia Working (BCMOECCS 2021a) or Accepted (BCMOECCS 2021b) Water Quality Guidelines for the Protection of Aquatic Life. For guidelines dependent on other analytes (e.g., hardness), guidelines were screened using concurrent values.

[b] When appropriate, site-specific Elk Valley Water Quality Plan Benchmarks (EVWQP; Teck 2014) or interim screening values were applied in addition to or instead of BC water quality guidelines. Interim screening values are displayed for nickel (Golder 2017b). Updated effects concentrations are displated for sulphate and nitrate (Golder, 2022).

[c] Temperature and pH dependent; range of minimum and maximum values.

[d] Dependent on concurrent chloride, range of values reported (BCMOECCS 2021b).

[e] Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

[f] Unrestricted change permitted within this pH range.

[g] For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness. If hardness values is lower than the minimum hardness, then guidelines were determined using the minimum hardness.

[h] Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

[i] The most conservative guideline (0.00000125 mg/L) was applied.

Table E.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2022

Station	Summary Statistic	Total Dissolved Solids (mg/L)	Lab pH	Field pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Ammonia (mg/L)	Sulphate (mg/L)	Total Chloride (mg/L)	Total Fluoride (mg/L)	Total Aluminum (mg/L)	Total Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)
LC_LC1 (RG_LI24)	n	15	15	26	51	15	15	15	15	15	15	15	15	15	15	15	15
	Annual Minimum	124	7.9	7.5	9.7	101	0.12	<0.001	<0.005	18	0.15	0.21	<0.003	<0.0001	0.00012	0.03	<0.00002
	Annual Maximum	248	8.4	8.4	89	131	0.26	0.0012	0.006	95	0.35	0.42	0.026	0.00013	0.00021	0.05	<0.00002
	Annual Mean	187	8.2	8.1	46	119	0.2	0.001	0.0051	55	0.25	0.32	0.0064	0.0001	0.00018	0.042	<0.00002
	Annual Median	194	8.2	8.2	13	120	0.2	0.001	0.005	57	0.25	0.35	0.0042	0.0001	0.00018	0.046	<0.00002
	% < LRL	0%	0%	0%	0%	0%	0%	93%	93%	0%	0%	0%	20%	93%	0%	0%	100%
	% > BCWQG[a]	-	-	0%	0%	0%	0%	0%	0%	0%	0%	-	0%	0%	-	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	-	0%	-	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
LC_SLC (RG_SLINE)	n	29	29	30	58	29	29	29	29	29	29	29	29	29	29	29	29
	Annual Minimum	103	7.9	7.3	9	113	0.039	<0.001	<0.005	7	0.11	0.13	<0.003	<0.0001	<0.0001	0.026	<0.00002
	Annual Maximum	258	8.5	8.4	88	158	0.17	0.0022	0.0084	71	0.87	0.37	0.047	<0.0001	0.00028	0.05	<0.00002
	Annual Mean	199	8.2	8.1	46	141	0.11	0.0011	0.0051	47	0.35	0.28	0.01	<0.0001	0.00014	0.041	<0.00002
	Annual Median	201	8.3	8.2	13	145	0.11	0.001	0.005	55	0.32	0.3	0.0032	<0.0001	0.00012	0.044	<0.00002
	% < LRL	0%	0%	0%	0%	0%	0%	90%	97%	0%	0%	0%	41%	100%	7%	0%	100%
	% > BCWQG[a]	-	-	0%	0%	0%	0%	0%	0%	0%	0%	-	0%	0%	-	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	-	0%	-	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
LC_LCUSWLC (RG_LCUT)	n	76	76	75	135	76	76	76	76	76	76	76	76	76	76	76	76
	Annual Minimum	290	7.8	6.2	9.8	143	3.5	<0.001	<0.005	92	2.3	0.14	<0.003	0.00019	0.0001	0.023	<0.00002
	Annual Maximum	945	8.3	9.1	93	256	24	0.021	0.041	417	15	0.31	0.067	0.00049	0.00032	0.078	<0.00002
	Annual Mean	701	8.1	7.8	44	216	15	0.002	0.0071	300	9.4	0.19	0.0058	0.00039	0.00015	0.059	<0.00002
	Annual Median	701	8.1	7.8	12	222	15	0.005	0.005	314	9.9	0.19	0.0039	0.00041	0.00015	0.063	<0.00002
	% < LRL	0%	0%	0%	0%	0%	0.0%	84%	78%	0%	0%	1%	21%	0%	0%	0%	100%
	% > BCWQG[a]	-	-	3%	0%	0%	100%	0%	0%	0%	0%	-	0%	0%	-	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	-	0%	-	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
LC_WLC	n	52	52	51	89	52	52	52	51	52	52	52	52	52	52	52	52
	Annual Minimum	819	7.9	7.1	9.5	313	5.9	<0.001	<0.005	349	0.81	0.1	<0.003	0.00034	0.00012	0.013	<0.00002
	Annual Maximum	2260	8.4	8.8	90	449	17	0.013	0.0088	1230	7.2	0.3	0.0067	0.00056	0.00037	0.029	0.000098
	Annual Mean	1775	8.2	7.8	43	364	13	0.0013	0.0051	1000	3.8	0.17	0.0033	0.00046	0.00024	0.022	0.000022
	Annual Median	1885	8.2	7.9	11	350	14	0.005	0.005	1105	3.9	0.16	0.006	0.00046	0.00025	0.022	0.00004
	% < LRL	0%	0%	0%	0%	0%	0.0%	96%	98%	0%	0%	2%	81%	0%	6%	0%	98%
	% > BCWQG[a]	-	-	0%	0%	0%	100%	0%	0%	94%	0%	-	0%	0%	-	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	-	0%	-	-
	% > Level 1 Benchmark/UEC	94%	-	-	-	-	0%	-	-	88%	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	0%	-	-	81%	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	0%	-	-	54%	-	-	-	-	-	-	-
LC_LC3 (RG_LILC3)	n	58	58	56	95	58	60	58	57	58	60	58	58	58	58	58	58
	Annual Minimum	360	7.7	7	9	166	4.7	<0.001	<0.005	129	3.8	0.15	<0.003	0.00026	<0.0001	0.023	<0.00002
	Annual Maximum	1090	8.4	9.5	98	257	15	0.0052	0.0092	541	44	0.32	0.019	0.00039	0.00023	0.063	<0.00002
	Annual Mean	792	8.1	7.7	44	222	11	0.0014	0.0052	365	21	0.2	0.005	0.00033	0.00014	0.05	<0.00002
	Annual Median	836	8.1	7.7	12	226	11	0.001	0.005	372	20	0.2	0.004	0.00032	0.00013	0.054	<0.00002
	% < LRL	0%	0%	0%	0%	0%	0%	86%	84%	0%	0%	2%	21%	0%	14%	0%	100%
	% > BCWQG[a]	-	-	2%	0%	0%	100%	0%	0%	31%	0%	-	0%	0%	-	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	-	0%	-	-
	% > Level 1 Benchmark/UEC	12%	-	-	-	-	3%	-	-	0%	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	3%	-	-	0%	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Values are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentrations were not measured, the most conservative concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and tabulated together with the biological monitoring area depicted in parenthesis.

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life.

Table E.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2022

Station	Summary Statistic	Total Dissolved Solids (mg/L)	Lab pH	Field pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Ammonia (mg/L)	Sulphate (mg/L)	Total Chloride (mg/L)	Total Fluoride (mg/L)	Total Aluminum (mg/L)	Total Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)
WL_DCP_SP24 (RG_LISP24)	n	4	4	4	8	4	4	4	4	4	4	4	4	4	4	4	4
	Annual Minimum	404	7.7	8.2	9.7	189	5.6	0.0015	<0.005	132	3.9	0.2	0.003	0.00021	0.00012	0.032	<0.00002
	Annual Maximum	678	8.4	8.4	88	219	10	0.0034	0.005	296	15	0.24	0.0042	0.00026	0.00015	0.057	<0.00002
	Annual Mean	572	8.2	8.3	47	203	8.1	0.0023	0.005	234	11	0.22	0.0034	0.00024	0.00014	0.048	<0.00002
	Annual Median	602	8.3	8.3	42	202	8.5	0.0021	0.005	254	12	0.22	0.0033	0.00026	0.00014	0.052	<0.00002
	% < LRL	0%	0%	0%	0%	0%	0.0%	0%	75%	0%	0%	0%	0%	0%	0%	0%	100%
	% > BCWQG[a]	-	-	0%	0%	0%	100%	0%	0%	0%	0%	-	0%	0%	-	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	-	0%	-	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
LC_LCDSSLCC (RG_LIDSL)	n	53	53	52	90	53	53	53	52	53	53	53	53	53	53	53	53
	Annual Minimum	237	7	7.3	9.3	142	2.8	<0.001	<0.005	88	2.5	0.16	<0.003	0.00016	<0.0001	0.023	<0.00002
	Annual Maximum	815	8.4	8.4	1202	248	13	0.0063	0.014	384	26	0.32	0.033	0.00048	0.00027	0.08	0.00012
	Annual Mean	600	8.2	8.1	56	202	8.3	0.0015	0.0053	257	13	0.21	0.0066	0.00023	0.00013	0.059	0.000022
	Annual Median	632	8.3	8.1	12	208	8.2	0.0013	0.005	271	13	0.22	0.0042	0.00023	0.00013	0.062	0.00002
	% < LRL	0%	0%	0%	0%	0%	0.0%	47%	87%	0%	0%	2%	26%	0%	17%	0%	98%
	% > BCWQG[a]	-	-	0%	0%	0%	98%	0%	0%	0%	0%	-	0%	0%	-	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	-	0%	-	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
LC_LCC (RG_LIDCOM)	n	4	4	6	12	4	4	4	4	4	4	4	4	4	4	4	4
	Annual Minimum	377	8.3	8.2	9.7	188	5.1	0.0011	<0.005	132	3.8	0.2	0.0032	0.00019	0.0001	0.041	<0.00002
	Annual Maximum	606	8.4	8.6	88	212	7.9	0.002	<0.005	255	12	0.24	0.024	0.00022	0.00014	0.068	<0.00002
	Annual Mean	528	8.4	8.4	47	199	6.8	0.0017	<0.005	206	8.9	0.22	0.0098	0.0002	0.00012	0.059	<0.00002
	Annual Median	564	8.4	8.4	44	198	7.1	0.0018	<0.005	218	9.6	0.22	0.0068	0.0002	0.00013	0.063	<0.00002
	% < LRL	0%	0%	0%	0%	0%	0.0%	0%	100%	0%	0%	0%	25%	0%	25%	0%	100%
	% > BCWQG[a]	-	-	0%	0%	0%	100%	0%	0%	0%	0%	-	0%	0%	-	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	-	0%	-	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
LC_LC4 (RG_LI8)	n	55	55	57	100	55	55	55	54	55	55	55	55	55	55	55	55
	Annual Minimum	236	7.9	7.8	9.6	131	2.2	<0.001	<0.005	71	1.9	0.15	<0.003	0.00013	<0.0001	0.031	<0.00002
	Annual Maximum	694	8.6	8.6	92	953	10	0.008	0.01	282	19	0.28	0.061	0.00024	0.00032	0.089	<0.00002
	Annual Mean	503	8.4	8.3	44	199	6.3	0.0018	0.0053	204	10	0.24	0.012	0.00018	0.00015	0.063	<0.00002
	Annual Median	523	8.4	8.3	13	191	6.5	0.0015	0.005	223	10	0.24	0.0047	0.00018	0.00014	0.066	<0.00002
	% < LRL	0%	0%	0%	0%	0%	0.0%	20%	89%	0%	0%	0%	11%	0%	2%	0%	100%
	% > BCWQG[a]	-	-	0%	0%	0%	95%	0%	0%	0%	0%	-	0%	0%	-	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	-	0%	-	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
LC_LC6 (RG_FRUL)	n	4	4	5	6	4	4	4	4	4	4	4	4	4	4	4	4
	Annual Minimum	358	7.8	8.1	9.1	185	6.4	0.0024	<0.005	109	1.5	0.14	0.003	0.0001	<0.0001	0.066	<0.00002
	Annual Maximum	597	8.4	8.5	88	204	13	0.0044	<0.005	231	4.7	0.2	0.054	0.00015	0.00018	0.11	<0.00002
	Annual Mean	524	8.2	8.3	48	195	11	0.0037	<0.005	190	3	0.18	0.018	0.00012	0.00013	0.096	<0.00002
	Annual Median	570	8.4	8.2	45	196	12	0.004	<0.005	211	2.9	0.18	0.007	0.00012	0.00012	0.1	<0.00002
	% < LRL	0%	0%	0%	0%	0%	0.0%	0%	100%	0%	0%	0%	0%	0%	25%	0%	100%
	% > BCWQG[a]	-	-	0%	0%	0%	100%	0%	0%	0%	0%	-	0%	0%	-	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	-	0%	-	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-

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Table E.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2022

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LC_LC5 (RG_FO23)	n	38	38	38	75	38	38	38	38	38	38	38	38	38	38	38	38
	Annual Minimum	269	8.1	7.7	9.4	149	5.2	0.0011	<0.005	79	1.4	0.14	<0.003	0.0001	<0.0001	0.052	<0.00002
	Annual Maximum	687	8.5	8.7	93	233	14	0.0078	0.036	274	7.8	0.22	0.45	0.00018	0.00048	0.11	0.000042
	Annual Mean	519	8.3	8.2	49	194	10	0.0036	0.0059	198	4.9	0.18	0.048	0.00013	0.00016	0.089	0.000021
	Annual Median	542	8.3	8.3	13	200	10	0.0029	0.005	213	5.2	0.18	0.013	0.00013	0.00013	0.093	0.00002
	% < LRL	0%	0%	0%	0%	0%	0.0%	0%	89%	0%	0%	0%	3%	16%	26%	0%	92%
	% > BCWQG[a]	-	-	0%	0%	0%	100%	0%	0%	0%	0%	-	8%	0%	-	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	-	0%	-	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Values are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentrations were not measured, the most conservative concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and tabulated together with the biological monitoring area depicted in parenthesis.

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life.

Table E.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2022

Station	Summary Statistic	Total Boron (mg/L)	Total Chromium (mg/L)	Total Cobalt (µg/L)	Total Iron (mg/L)	Total Lead (mg/L)	Total Lithium (mg/L)	Total Manganese (mg/L)	Total Mercury (mg/L)	Total Molybdenum (mg/L)	Total Nickel (µg/L)	Total Selenium (µg/L)	Total Silver (mg/L)	Total Thallium (mg/L)	Total Uranium (mg/L)	Total Zinc (mg/L)
LC_LC1 (RG_LI24)	n	15	15	15	15	15	15	15	15	15	15	17	15	15	15	15
	Annual Minimum	<0.01	0.00015	<0.0001	<0.01	<0.00005	0.0022	<0.0001	<0.0000005	0.00056	<0.5	1.3	<0.00001	<0.00001	0.00072	<0.003
	Annual Maximum	<0.01	0.00027	<0.0001	0.023	<0.00005	0.0044	0.00088	<0.0000005	0.0017	0.8	3.3	<0.00001	0.000042	0.0018	0.0081
	Annual Mean	<0.01	0.0002	<0.0001	0.011	<0.00005	0.0035	0.00024	<0.0000005	0.00096	0.59	2.4	<0.00001	0.000012	0.0014	0.0035
	Annual Median	<0.01	0.00021	<0.0001	0.01	<0.00005	0.0035	0.00012	<0.0000005	0.00096	0.54	2.7	<0.00001	0.00001	0.0014	0.003
	% < LRL	100%	0%	100%	87%	100%	0%	47%	100%	0%	40%	0%	100%	93%	0%	53%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	67%	0%	-	71%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%
	% > Level 1 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_SLC (RG_SLINE)	n	29	29	29	29	29	29	29	29	29	29	31	29	29	29	29
	Annual Minimum	<0.01	0.00013	<0.0001	<0.01	<0.00005	0.0012	<0.0001	<0.0000005	0.00043	<0.5	0.46	<0.00001	<0.00001	0.0006	<0.003
	Annual Maximum	<0.01	0.0005	<0.0001	0.098	0.00013	0.0045	0.0048	0.00000078	0.0015	0.6	1.7	<0.00001	<0.00001	0.002	0.0081
	Annual Mean	<0.01	0.00023	<0.0001	0.017	0.000053	0.0031	0.00051	0.00000053	0.0011	0.5	1.3	<0.00001	<0.00001	0.0015	0.0034
	Annual Median	<0.01	0.00021	<0.0001	0.01	0.00005	0.0034	0.00013	0.000005	0.0013	0.5	1.4	<0.00001	<0.00001	0.0016	0.003
	% < LRL	100%	0%	100%	72%	93%	3%	45%	97%	0%	97%	0%	100%	100%	0%	76%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	69%	0%	-	0%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%
	% > Level 1 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_LCUSWLC (RG_LCUT)	n	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76
	Annual Minimum	<0.01	0.0001	<0.0001	<0.01	<0.00005	0.02	<0.0001	<0.0000005	0.0011	5.3	17	<0.00001	<0.00001	0.0016	0.0089
	Annual Maximum	0.025	0.00023	0.00016	0.082	0.00072	0.089	0.0054	0.0000064	0.003	14	90	<0.00001	0.000026	0.006	0.049
	Annual Mean	0.018	0.00014	0.0001	0.013	0.00006	0.067	0.00033	0.00000059	0.002	11	60	<0.00001	0.000015	0.0044	0.014
	Annual Median	0.019	0.00014	0.0001	0.01	0.00005	0.073	0.00014	0.000005	0.002	12	61	<0.00001	0.000015	0.0045	0.012
	% < LRL	3%	9%	82%	92%	95%	0%	28%	97%	0%	0%	0%	100%	4%	0%	0%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	59%	0%	-	100%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%
	% > Level 1 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_WLC	n	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
	Annual Minimum	0.012	<0.0001	<0.0001	<0.01	<0.00005	0.02	<0.0001	0.00000078	0.0011	15	160	<0.00001	<0.00002	0.0065	<0.006
	Annual Maximum	0.45	0.00035	0.00015	0.013	0.000061	0.044	0.002	0.0000013	0.0055	51	538	0.000015	0.00004	0.023	0.11
	Annual Mean	0.026	0.00013	0.00011	0.01	0.00005	0.036	0.00059	0.00000099	0.0032	26	398	0.00001	0.000027	0.017	0.043
	Annual Median	0.018	0.00011	0.0002	0.02	0.0001	0.037	0.00015	0.00000099	0.004	20	426	0.00002	0.000027	0.018	0.017
	% < LRL	44%	65%	92%	98%	98%	0%	52%	73%	0%	0%	0%	98%	2%	0%	27%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	75%	0%	-	100%	0%	0%	92%	0%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%
	% > Level 1 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_LC3 (RG_LILC3)	n	58	58	58	58	58	58	58	58	58	58	60	58	58	58	58
	Annual Minimum	0.011	<0.0001	<0.0001	<0.01	<0.00005	0.026	0.001	<0.0000005	0.0016	7.3	28	<0.00001	<0.00001	0.0023	0.0062
	Annual Maximum	0.023	0.005	0.00036	0.2	0.000094	0.079	0.067	0.00000074	0.007	13	66	<0.00001	0.000037	0.006	0.027
	Annual Mean	0.018	0.00023	0.00019	0.059	0.000051	0.061	0.027	0.00000053	0.004	10	49	<0.00001	0.000014	0.0047	0.013
	Annual Median	0.019	0.00014	0.00018	0.046	0.00005	0.064	0.026	0.000005	0.0039	9.9	50	<0.00001	0.000013	0.0049	0.011
	% < LRL	0%	5%	9%	10%	98%	0%	0%	95%	0%	0%	0%	100%	31%	0%	0%
	% > BCWQG[a]	0%	2%	0%	-	0%	-	0%	74%	0%	-	100%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%
	% > Level 1 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
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Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Values are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentrations were not measured, the most conservative concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and tabulated together with the biological monitoring area depicted in parenthesis.

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life.

Table E.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2022

Station	Summary Statistic	Total Boron (mg/L)	Total Chromium (mg/L)	Total Cobalt (µg/L)	Total Iron (mg/L)	Total Lead (mg/L)	Total Lithium (mg/L)	Total Manganese (mg/L)	Total Mercury (mg/L)	Total Molybdenum (mg/L)	Total Nickel (µg/L)	Total Selenium (µg/L)	Total Silver (mg/L)	Total Thallium (mg/L)	Total Uranium (mg/L)	Total Zinc (mg/L)
WL_DCP_SP24 (RG_LISP24)	n	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Annual Minimum	0.01	0.00015	<0.0001	<0.01	<0.00005	0.026	0.0015	<0.0000005	0.0013	6.1	26	<0.00001	<0.00001	0.0024	0.0053
	Annual Maximum	0.016	0.00021	<0.0001	0.035	<0.00005	0.05	0.011	<0.0000005	0.003	7	45	<0.00001	<0.00001	0.0043	0.015
	Annual Mean	0.014	0.00017	<0.0001	0.018	<0.00005	0.043	0.007	<0.0000005	0.0023	6.5	37	<0.00001	<0.00001	0.0036	0.0091
	Annual Median	0.014	0.00016	<0.0001	0.014	<0.00005	0.048	0.0078	<0.0000005	0.0024	6.5	38	<0.00001	<0.00001	0.0038	0.008
	% < LRL	0%	0%	100%	25%	100%	0%	0%	100%	0%	0%	0%	100%	100%	0%	0%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	75%	0%	-	100%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%
	% > Level 1 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_LCDSSLCC (RG_LIDSL)	n	53	53	53	53	53	53	53	53	53	53	54	53	53	53	53
	Annual Minimum	<0.01	0.0001	<0.0001	0.01	<0.00005	0.016	0.00041	<0.0000005	0.0011	3.9	18	<0.00001	<0.00001	0.0016	0.0036
	Annual Maximum	0.017	0.00097	0.00023	0.071	0.00035	0.058	0.015	0.00000062	0.0038	8.4	56	0.000046	0.00016	0.0047	0.019
	Annual Mean	0.014	0.00017	0.0001	0.017	0.000057	0.043	0.0054	0.00000051	0.0025	5.1	39	0.000011	0.000013	0.0034	0.007
	Annual Median	0.015	0.00015	0.0001	0.012	0.00005	0.044	0.0047	0.000005	0.0026	5	41	0.00001	0.00001	0.0036	0.0056
	% < LRL	11%	0%	92%	32%	96%	0%	0%	98%	0%	0%	0%	98%	81%	0%	0%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	74%	0%	-	100%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%
	% > Level 1 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_LCC (RG_LIDCOM)	n	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Annual Minimum	<0.01	0.00014	<0.0001	<0.01	<0.00005	0.027	0.0012	0.00000058	0.0014	3.7	24	<0.00001	<0.00001	0.0022	0.0036
	Annual Maximum	0.016	0.00017	<0.0001	0.038	<0.00005	0.042	0.0063	0.00000058	0.0025	4.7	37	<0.00001	<0.00001	0.0036	0.0092
	Annual Mean	0.013	0.00015	<0.0001	0.017	<0.00005	0.037	0.0032	0.00000058	0.0021	4.2	33	<0.00001	<0.00001	0.003	0.0058
	Annual Median	0.014	0.00015	<0.0001	0.01	<0.00005	0.04	0.0026	0.00000058	0.0022	4.2	35	<0.00001	<0.00001	0.0032	0.0052
	% < LRL	25%	0%	100%	75%	100%	0%	0%	75%	0%	0%	0%	100%	100%	0%	0%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	75%	0%	-	100%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%
	% > Level 1 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_LC4 (RG_LI8)	n	55	55	55	55	55	55	55	55	55	55	57	55	55	55	55
	Annual Minimum	0.01	0.0001	<0.0001	<0.01	<0.00005	0.013	0.00076	<0.0000005	0.00098	2.2	12	<0.00001	<0.00001	0.0014	<0.003
	Annual Maximum	0.016	0.00056	0.00015	0.086	0.000096	0.049	0.0093	0.00000059	0.0032	4.7	44	<0.00001	0.00001	0.0038	0.019
	Annual Mean	0.013	0.00019	0.0001	0.019	0.000052	0.034	0.0022	0.00000051	0.0022	3.4	30	<0.00001	0.00001	0.0029	0.0054
	Annual Median	0.013	0.00017	0.0001	0.01	0.00005	0.036	0.0014	0.000005	0.0023	3.4	32	<0.00001	0.00001	0.0031	0.0042
	% < LRL	13%	0%	93%	69%	93%	0%	0%	98%	0%	0%	0%	100%	95%	0%	2%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	73%	0%	-	100%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%
	% > Level 1 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_LC6 (RG_FRUL)	n	4	4	4	4	4	4	4	4	4	4	5	4	4	4	4
	Annual Minimum	0.01	0.00011	<0.0001	<0.01	<0.00005	0.018	0.00031	0.00000082	0.00088	<0.5	27	<0.00001	<0.00001	0.0016	<0.003
	Annual Maximum	0.013	0.00021	<0.0001	0.092	0.000067	0.03	0.0064	0.00000082	0.0016	1.9	49	<0.00001	<0.00001	0.0028	<0.003
	Annual Mean	0.011	0.00014	<0.0001	0.033	0.000058	0.025	0.0026	0.00000082	0.0012	1	41	<0.00001	<0.00001	0.0022	<0.003
	Annual Median	0.01	0.00013	<0.0001	0.014	0.000056	0.027	0.0018	0.00000082	0.0012	0.88	43	<0.00001	<0.00001	0.0022	<0.003
	% < LRL	50%	0%	100%	50%	50%	0%	0%	75%	0%	25%	0%	100%	100%	0%	100%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	75%	0%	-	100%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%
	% > Level 1 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Table E.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2022

Station	Summary Statistic	Total Boron (mg/L)	Total Chromium (mg/L)	Total Cobalt (µg/L)	Total Iron (mg/L)	Total Lead (mg/L)	Total Lithium (mg/L)	Total Manganese (mg/L)	Total Mercury (mg/L)	Total Molybdenum (mg/L)	Total Nickel (µg/L)	Total Selenium (µg/L)	Total Silver (mg/L)	Total Thallium (mg/L)	Total Uranium (mg/L)	Total Zinc (mg/L)
LC_LC5 (RG_FO23)	n	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
	Annual Minimum	<0.01	0.00012	<0.0001	<0.01	<0.00005	0.016	0.00037	<0.0000005	0.0011	0.72	21	<0.00001	<0.00001	0.0014	<0.003
	Annual Maximum	0.012	0.00085	0.00048	0.83	0.00058	0.035	0.058	0.0000057	0.002	3.3	60	0.000015	0.000023	0.003	0.011
	Annual Mean	0.01	0.00026	0.00012	0.089	0.000099	0.026	0.0068	0.00000067	0.0014	1.5	42	0.00001	0.000011	0.0024	0.0035
	Annual Median	0.01	0.00018	0.0001	0.021	0.00005	0.027	0.0017	0.000005	0.0014	1.4	43	0.00001	0.00001	0.0025	0.003
	% < LRL	63%	0%	84%	29%	66%	0%	0%	92%	0%	0%	0%	97%	92%	0%	79%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	71%	0%	-	100%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%
	% > Level 1 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark/UEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Values are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentrations were not measured, the most conservative concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and tabulated together with the biological monitoring area depicted in parenthesis.

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life.

Table E.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2022

Station	Summary Statistic	Dissolved Cadmium (µg/L)	Dissolved Cobalt (µg/L)	Dissolved Copper (mg/L)	Dissolved Iron (mg/L)	Dissolved Nickel (µg/L)
LC_LC1 (RG_LI24)	n	15	15	15	15	11
	Annual Minimum	<0.005	<0.1	<0.0002	<0.01	<0.5
	Annual Maximum	0.0095	<0.1	0.0004	<0.01	0.72
	Annual Mean	0.0071	<0.1	0.00022	<0.01	0.57
	Annual Median	0.0071	<0.1	0.0002	<0.01	0.5
	% < LRL	13%	100%	80%	100%	55%
	% > BCWQG[a]	0%	-	13%	-	-
	% > BCWQG[b]	0%	-	0%	0%	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	0%
	% > Level 2 Benchmark/UEC	-	-	-	-	0%
	% > Level 3 Benchmark/UEC	-	-	-	-	0%
LC_SLC (RG_SLINE)	n	29	29	29	29	12
	Annual Minimum	<0.005	<0.1	<0.0002	<0.01	<0.5
	Annual Maximum	0.016	<0.1	0.00043	0.017	0.51
	Annual Mean	0.012	<0.1	0.00022	0.01	0.5
	Annual Median	0.011	<0.1	0.0002	0.01	0.5
	% < LRL	3%	100%	76%	97%	92%
	% > BCWQG[a]	0%	-	3%	-	-
	% > BCWQG[b]	0%	-	0%	0%	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	0%
	% > Level 2 Benchmark/UEC	-	-	-	-	0%
	% > Level 3 Benchmark/UEC	-	-	-	-	0%
LC_LCUSWLC (RG_LCUT)	n	76	74	76	76	12
	Annual Minimum	0.15	<0.1	<0.0002	<0.01	6.2
	Annual Maximum	0.56	0.13	0.0007	0.012	12
	Annual Mean	0.33	0.1	0.00033	0.01	10
	Annual Median	0.3	0.1	0.0003	0.01	11
	% < LRL	0%	95%	1%	99%	0%
	% > BCWQG[a]	11%	-	33%	-	-
	% > BCWQG[b]	0%	-	3%	0%	-
	% > Level 1 Benchmark/UEC	13%	-	-	-	100%
	% > Level 2 Benchmark/UEC	-	-	-	-	92%
	% > Level 3 Benchmark/UEC	-	-	-	-	50%
LC_WLC	n	52	50	52	52	12
	Annual Minimum	0.049	<0.1	0.00042	<0.01	16
	Annual Maximum	3.6	0.14	0.012	0.11	42
	Annual Mean	1.1	0.1	0.0011	0.014	24
	Annual Median	0.48	0.2	0.0008	0.02	19
	% < LRL	2%	94%	0%	90%	0%
	% > BCWQG[a]	50%	-	65%	-	-
	% > BCWQG[b]	15%	-	4%	0%	-
	% > Level 1 Benchmark/UEC	40%	-	-	-	100%
	% > Level 2 Benchmark/UEC	-	-	-	-	100%
	% > Level 3 Benchmark/UEC	-	-	-	-	83%
LC_LC3 (RG_LILC3)	n	58	56	58	58	12
	Annual Minimum	0.14	<0.1	<0.0002	<0.01	8.1
	Annual Maximum	0.69	0.27	0.00079	0.037	12
	Annual Mean	0.31	0.17	0.00034	0.011	9.5
	Annual Median	0.29	0.16	0.00029	0.01	9.1
	% < LRL	0%	11%	2%	90%	0%
	% > BCWQG[a]	16%	-	43%	-	-
	% > BCWQG[b]	0%	-	0%	0%	-
	% > Level 1 Benchmark/UEC	16%	-	-	-	100%
	% > Level 2 Benchmark/UEC	-	-	-	-	100%
	% > Level 3 Benchmark/UEC	-	-	-	-	17%

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Values are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentrations were not measured, the most conservative concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and tabulated together with the biological monitoring area depicted in parenthesis.

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life.

Table E.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2022

Station	Summary Statistic	Dissolved Cadmium (µg/L)	Dissolved Cobalt (µg/L)	Dissolved Copper (mg/L)	Dissolved Iron (mg/L)	Dissolved Nickel (µg/L)
WL_DCP_SP24 (RG_LISP24)	n	4	4	4	4	4
	Annual Minimum	0.14	<0.1	0.00021	<0.01	5.4
	Annual Maximum	0.33	<0.1	0.00037	<0.01	6.9
	Annual Mean	0.22	<0.1	0.00026	<0.01	6.1
	Annual Median	0.2	<0.1	0.00022	<0.01	5.9
	% < LRL	0%	100%	0%	100%	0%
	% > BCWQG[a]	0%	-	0%	-	-
	% > BCWQG[b]	0%	-	0%	0%	-
	% > Level 1 Benchmark/UEC	25%	-	-	-	100%
	% > Level 2 Benchmark/UEC	-	-	-	-	75%
	% > Level 3 Benchmark/UEC	-	-	-	-	0%
LC_LCDSSLCC (RG_LIDSL)	n	53	51	53	53	12
	Annual Minimum	0.019	<0.1	<0.0002	<0.01	4
	Annual Maximum	0.38	0.19	0.0012	0.035	5.9
	Annual Mean	0.16	0.1	0.00027	0.01	4.8
	Annual Median	0.14	0.1	0.0002	0.01	4.6
	% < LRL	0%	96%	51%	98%	0%
	% > BCWQG[a]	0%	-	8%	-	-
	% > BCWQG[b]	0%	-	0%	0%	-
	% > Level 1 Benchmark/UEC	2%	-	-	-	92%
	% > Level 2 Benchmark/UEC	-	-	-	-	25%
	% > Level 3 Benchmark/UEC	-	-	-	-	0%
LC_LCC (RG_LIDCOM)	n	4	4	4	4	4
	Annual Minimum	0.088	<0.1	<0.0002	<0.01	3.4
	Annual Maximum	0.24	<0.1	0.00031	<0.01	4.6
	Annual Mean	0.15	<0.1	0.00023	<0.01	4
	Annual Median	0.14	<0.1	0.0002	<0.01	4
	% < LRL	0%	100%	50%	100%	0%
	% > BCWQG[a]	0%	-	0%	-	-
	% > BCWQG[b]	0%	-	0%	0%	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	50%
	% > Level 2 Benchmark/UEC	-	-	-	-	25%
	% > Level 3 Benchmark/UEC	-	-	-	-	0%
LC_LC4 (RG_LI8)	n	55	53	55	55	12
	Annual Minimum	0.0078	<0.1	<0.0002	<0.01	2.5
	Annual Maximum	0.2	0.21	0.0012	0.013	4.1
	Annual Mean	0.081	0.1	0.00024	0.01	3.2
	Annual Median	0.065	0.1	0.0002	0.01	3.3
	% < LRL	2%	98%	73%	98%	0%
	% > BCWQG[a]	0%	-	2%	-	-
	% > BCWQG[b]	0%	-	0%	0%	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	17%
	% > Level 2 Benchmark/UEC	-	-	-	-	0%
	% > Level 3 Benchmark/UEC	-	-	-	-	0%
LC_LC6 (RG_FRUL)	n	4	4	4	4	4
	Annual Minimum	0.0069	<0.1	<0.0002	<0.01	<0.5
	Annual Maximum	0.023	<0.1	0.00023	<0.01	1.6
	Annual Mean	0.014	<0.1	0.00021	<0.01	0.89
	Annual Median	0.014	<0.1	0.0002	<0.01	0.75
	% < LRL	0%	100%	75%	100%	25%
	% > BCWQG[a]	0%	-	0%	-	-
	% > BCWQG[b]	0%	-	0%	0%	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	0%
	% > Level 2 Benchmark/UEC	-	-	-	-	0%
	% > Level 3 Benchmark/UEC	-	-	-	-	0%

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Values are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentrations were not measured, the most conservative concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and tabulated together with the biological monitoring area depicted in parenthesis.

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Table E.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2022

Station	Summary Statistic	Dissolved Cadmium (µg/L)	Dissolved Cobalt (µg/L)	Dissolved Copper (mg/L)	Dissolved Iron (mg/L)	Dissolved Nickel (µg/L)
LC_LC5 (RG_FO23)	n	38	38	38	38	12
	Annual Minimum	<0.005	<0.1	<0.0002	<0.01	0.73
	Annual Maximum	0.065	<0.1	0.0025	0.024	1.6
	Annual Mean	0.024	<0.1	0.00028	0.01	1.2
	Annual Median	0.023	<0.1	0.0002	0.01	1.3
	% < LRL	3%	100%	71%	92%	0%
	% > BCWQG[a]	0%	-	3%	-	-
	% > BCWQG[b]	0%	-	0%	0%	-
	% > Level 1 Benchmark/UEC	0%	-	-	-	0%
	% > Level 2 Benchmark/UEC	-	-	-	-	0%
	% > Level 3 Benchmark/UEC	-	-	-	-	0%

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Values are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentrations were not measured, the most conservative concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and tabulated together with the biological monitoring area depicted in parenthesis.

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[b] Short-term maximum BCQWG for the Protection of Aquatic Life.

Table E.3: Acute Toxicity Results for Line Creek Operations, 2022

Location	Date	48-h *Daphnia magna*	96-h *Oncorhynchus mykiss*
		Percent (%) Mortality	Percent (%) Mortality
WL_BFWB_OUT_SP21	10-Jan-22	0	0
	24-Jan-22	0	0
	7-Feb-22	0	0
	21-Feb-22	3	0
	7-Mar-22	3	0
	21-Mar-22	0	0
	4-Apr-22	0	0
	18-Apr-22	0	0
	2-May-22	3	0
	16-May-22	0	0
	30-May-22	0	0
	13-Jun-22	0	0
	27-Jun-22	-	0
	27-Jun-22	0	-
	11-Jul-22	0	0
	25-Jul-22	-	0
	25-Jul-22	0	-
	8-Aug-22	0	0
	22-Aug-22	0	0
	5-Sep-22	0	10
	19-Sep-22	0	0
	3-Oct-22	0	0
	17-Oct-22	0	0
	31-Oct-22	0	0
	14-Nov-22	0	0
	28-Nov-22	0	0
	12-Dec-22	0	0
	27-Dec-22	0	0

Note: "-" indicates no data available.

APPENDIX F
BIOLOGICAL TRIGGERS

APPENDIX F BIOLOGICAL TRIGGERS

F1 INTRODUCTION

F1.1 Background

Biological triggers were developed and implemented to assist with identifying and communicating unexpected and potentially important changes in aquatic ecosystem conditions and are required as part of Teck's Adaptive Management Plan (AMP; Teck 2018). Biological triggers were developed in consultation with the Environmental Monitoring Committee (EMC) for a subset of the biological monitoring endpoints that are effective indicators of changes at the ecosystem level. The purpose of the biological triggers is to quickly identify biological monitoring areas where unexpected biological conditions may be occurring that may require management action. Additionally, information provided from the analysis of biological triggers may lead to responses under the AMP response framework.

Draft biological triggers were developed in the 2018 AMP (Teck 2018) under Management Question 5, with these initially reported on in 2021 in the 2020 Local Aquatic Effects Monitoring Program (LAEMP) reports and Regional Aquatic Effects Monitoring Program (RAEMP) data package, and summarized in the 2020 Annual AMP Report (Teck 2021a). When the 2018 AMP was approved, there was an expectation that the 2018 AMP draft/interim biological triggers would be finalized, through engagement with the EMC, prior to December 15, 2021 AMP Update. The biological triggers were finalized in 2021 (Teck 2021b) and the methods applied in this report reflect the finalized biological triggers (Teck 2021b). It is important to note that the process and/or biological triggers may adjust over time as the purpose of the biological triggers is to be reflective of not only changes in the Elk Valley, but also the current state of knowledge in the area.

The finalized biological triggers (Teck 2021b) include three measurement endpoints:

- Percent EPT (% EPT; Ephemeroptera, Plecoptera, and Trichoptera) – based on travelling kick samples (CABIN protocol), generally three replicates per location per sampling event.
- Benthic invertebrate tissue selenium (BIT Se) – generally several replicates collected per location per sampling event, where each replicate is a composite sample of invertebrates (i.e., composite-taxa sample).
- Westslope cutthroat trout muscle tissue selenium (WCT Se) – generally 8 replicates collected per location per sampling event, where each replicate corresponds to a sample from a single fish.

Evaluation of these three biological trigger endpoints is complementary to the fulsome evaluation of biological endpoints that is integrated into the LAEMP and RAEMP data evaluations. The fulsome evaluation of biological endpoints is used to support answering the specific LAEMP and RAEMP study questions through the consideration of not only the endpoints used in the biological trigger evaluation, but also a full suite of additional biological, chemical, and physical endpoints. Biological triggers do not provide information on cause and effect, report on trends, or feed directly into decision-making processes. Instead, the biological triggers act to flag areas for further evaluation, which would then take place under existing monitoring programs, through the development of supporting studies or through the response framework, as necessary.

Biological monitoring data are compared to triggers annually, and summaries of the LAEMP and RAEMP trigger evaluations and responses are summarized within annual AMP reports.

F2 METHODS

F2.1 Overview

As outlined in Section F1.1, analyses for biological triggers are meant to be complementary to other analyses conducted in the LAEMPs and RAEMP. Biological trigger analyses included all three trigger endpoints (%EPT and BIT Se [collected under the 2022 Line Creek Operation (LCO) LAEMP], and westslope cutthroat trout [WCT] muscle tissue Se at RG_LIDSL [collected as confirmatory sampling for the RAEMP; Minnow 2021b]).

For the purpose of application of the biological triggers, expectations for the endpoints evaluated (%EPT, BIT Se, and WCT muscle tissue Se) were based on projected water quality, not on measured water quality. Thus, the triggers should detect biological results that were unexpected, regardless of whether those results are due to unexpected water quality or due to unexpected relationships between water quality and biological endpoints. Biological triggers were therefore only applied at locations where water quality projections were available. Specifically, five of the mine-exposed areas (RG_LCUT, RG_LILC3, RG_LIDSL, RG_LI8, and RG_FO23) and both reference areas (RG_LI24 and RG_SLINE) included in the LCO LAEMP were evaluated for biological trigger events. Data for other areas studied under the LCO LAEMP (RG_LIDCOM, RG_LISP24, and RG_FRUL) were not available to be evaluated relative to biological triggers but were assessed elsewhere as part of the main LCO LAEMP report.

Methodological details are discussed for each of the biological trigger metrics below.

F2.2 Percent EPT

Data for percent EPT were compared to:

- Normal range: The lower limit of the habitat-adjusted normal range (2.5th percentile). Up-to-date limits of normal ranges[1] are provided in the RAEMP and LAEMPs, where they are recalculated as needed as new data become available (Teck 2019). The derivation of habitat-adjusted normal ranges is described in Appendix J of the 2020 RAEMP, and was based on consideration of more than 30 habitat, substrate, GIS, and land cover variables (Minnow 2020).
- Expectations: The lower limit of the range of %EPT corresponds to the predicted aquatic data integration tool (ADIT) score. The predicted ADIT scores correspond to potential effects on benthic invertebrate community (BIC) endpoints, based on

[1] The normal range will be updated as part of the three year reporting cycle of the RAEMP (Minnow 2021b).

relationships between water quality projections (for nitrate, sulphate and cadmium)[2] and invertebrate toxicity endpoints originally developed for the Elk Valley Water Quality Plan (EVWQP; Teck 2014; Golder 2020a). A predicted ADIT score of 3 corresponds to 50% or greater effects to reproduction of the water flea *Ceriodaphnia dubia*, 2 corresponds to 20 to 50% effects, 1 corresponds to 10 to 20% effects, and 0 corresponds to effect levels of 10% or less. Once %EPT is actually measured, the measured results are converted to a measured ADIT score in relation to the habitat adjusted normal range as follows: An ADIT score of 0 corresponds to expected %EPT ≥ the 10th percentile of the habitat-adjusted normal range; an ADIT score of 1 corresponds to expected %EPT between the 10th percentile and the 2.5th percentile of the habitat-adjusted normal range (and is therefore identical in application to the lower limit of normal range); an ADIT score of 2 corresponds to expected %EPT between the 2.5th percentile and half of the 2.5th percentile of the habitat-adjusted normal range; finally, an ADIT score of 3 corresponds to expected %EPT ≤ half of the 2.5th percentile and ≥ 0. Individual replicate habitat-adjusted normal ranges were used at each location for establishing the %EPT limits associated with each ADIT score. In summary, this component of the biological trigger for %EPT asks whether the measured ADIT score – calculated based on measured %EPT relative to normal ranges – is greater than the ADIT score that was predicted based on water quality projections.

Benthic invertebrate community data for %EPT collected in the fall (September) for the 2022 LCO LAEMP were included in the biological trigger analysis.

F2.3 Benthic Invertebrate Tissue Selenium (BIT Se)

Data for BIT Se were compared to:

- Normal range: The upper limit of the regional normal range (97.5th percentile) for individual replicates. Up-to-date limits of normal ranges[3] are provided in the RAEMP and LAEMPs, where they are recalculated as needed as new data become available (Teck 2019).
- Expectations: The upper limit of the 95% prediction interval based on the water to BIT bioaccumulation model for lotic environments. The model originally developed in the EVWQP (Golder 2014) was updated (Golder 2020b) and the updated data set was used to calculate prediction intervals for individual replicates. Methodology for estimating the upper limit of the 95% prediction for BIT Se (given any projected value

[2] Selenium was not included because selenium effects on BIC endpoints are not expected. Projections were based on the highest maximum monthly mean across all flow scenarios (low, average, and high).

[3] The normal range will be updated as part of the three-year reporting cycle of the RAEMP (Minnow 2021b).

of aqueous selenium) is discussed further in the Biological Trigger Development for the Elk Valley Adaptive Management Plan (Azimuth 2021).

Benthic invertebrate tissue selenium data from sampling events completed throughout 2022 for the LCO LAEMP (May, July, September, and November/December[4]) were included in the biological trigger analysis although normal range information is based on fall (September) information.

Although effects benchmarks are not part of the trigger, they are relevant for interpreting potential significance and responses. Consequently, the level 1, 2 and 3 benchmarks for the most sensitive receptor (juvenile fish via dietary exposure) are included in plots (11, 18, and 26 mg/kg, respectively).

F2.4 Westslope Cutthroat Trout Muscle Tissue Selenium (WCT Se)

Data for WCT muscle tissue Se were compared to:

- Normal range: The upper limit of the regional normal range (97.5th percentile). Up-to-date limits of normal ranges[5] are provided in the RAEMP and LAEMPs, where they are recalculated as needed as new data become available (Teck 2019).
- Expectations: The upper limit of the 95% prediction interval based on bioaccumulation models. For a given selenium concentration in water, the best estimate of expected concentration in WCT muscle tissue is generated using a 2-step bioaccumulation model – water to invertebrates, and invertebrates to fish eggs – after which a conversion factor is used to convert muscle selenium concentration from egg selenium concentrations. Prediction errors for new replicate samples (i.e., individual fish) are based on a different data set that relates fish directly to water. Methodology for estimating the upper limit of the 95% prediction interval for WCT muscle Se (given any projected value of aqueous selenium) is discussed further in the Biological Trigger Development for the Elk Valley Adaptive Management Plan (Azimuth 2021).

Although effects benchmarks are not part of the trigger, they are relevant for interpreting potential significance and responses. Consequently, the site-specific muscle benchmark are included in the plots (15.5 mg/kg dw; Nautilus Environmental and Interior Reforestation 2011).

[4] Benthic invertebrate tissue samples from RG_LI8 and RG_FO23 were not collected during the December sampling period due to safety concerns.

[5] The normal range will be updated as part of the three-year reporting cycle of the RAEMP (Minnow 2021b).

F3 RESULTS

F3.1 Percent EPT

Individual replicates for the %EPT endpoint for each of the five mine-exposed areas (RG_LCUT, RG_LILC3, RG_LIDSL, RG_LI8, and RG_FO23) as well as the reference areas (RG_LI24 and RG_SLINE) were each assessed against their respective biological triggers for the September sampling period (Table F.1, Figure F.1). Four mine-exposed areas (RG_LCUT [3 of 3 replicates], RG_LILC3 [3 of 3 replicates], RG_LIDSL [3 of 5 replicates] and RG_FO23 [3 of 5 replicates] had % EPT results that were lower than the biological trigger value. RG_LILC3 (the area closest in downstream proximity to the active water treatment facility [AWTF]) had %EPT ranging from 5.3 to 7.9% (substantially lower than the lower 2.5th percentile prediction limit of the biological trigger, ranging from 71.8 to 76.1%, while %EPT values that reached the trigger from areas further downstream did not show the same magnitude of difference (i.e. RG_LIDSL and RG_FO23). However, RG_LCUT also had substantially lower %EPT than the biological trigger values (reported values: 7.3 to 10.1%; lower 2.5th percentile prediction limit values: 68.4 to 74.3%), indicating that the results are likely not AWTF related. Additionally, %EPT at RG_LI8 did not reach the biological trigger (i.e., were higher than the trigger value).

RG_FO23 had three %EPT values which were lower than the trigger (66.6 to 69.4 %EPT [reported value] compared to 67.0 to 70.1 %EPT [lower 2.5th percentile trigger prediction limit]; Table F.1, Figure F.1) but this area is located in the Fording River downstream of Line Creek and did not follow the same spatial pattern observed in Line Creek (i.e., fewer results lower than the trigger with increasing distance from the AWTF indicating the results were not AWTF-related.

Replicates from the reference areas, RG_LI24 [5 of 5 replicates] and RG_SLINE [3 of 3 replicates], did not reach the biological trigger (i.e., were higher than the trigger value; Table F.1, Figure F.1).

F3.2 Benthic Invertebrate Tissue Selenium (BIT Se)

Benthic invertebrate tissue selenium concentrations for each mine-exposed and reference area were assessed against their respective biological trigger for individual replicate samples from each of the four sampling events (May, July, September, and November/December; Table F.2, Figure F.2). A single sample exceeded the biological trigger at RG_SLINE in September but otherwise no other replicates downstream of the AWTF discharge reached the biological trigger. These areas are located upstream of the AWTF discharge (and thus not

influenced by the AWTF), and the single sample from RG_SLINE exceeded the biological trigger by 13% (12.0 compared to 10.6 mg/kg dw). The remaining mine-exposed areas downstream of the outfall (RG_LILC3, RG_LIDSL, RG_LI8, and RG_FO23) and reference area (RG_LI24) had selenium concentrations that were below the biological trigger (Table F.2, Figure F.2).

F3.3 Westslope cutthroat trout muscle tissue selenium (WCT Se)

Westslope cutthroat trout muscle tissue selenium concentrations from the mine-exposed area RG_LIDSL were assessed against their respective biological trigger for individual replicates (collected as confirmatory sampling for the RAEMP in September, Minnow 2021b). One of the eight WCT muscle tissue samples collected at RG_LIDSL had a selenium concentration that exceeded the biological trigger by 20.8% (18.0 mg/kg dw compared to 14.9 mg/kg dw; Table F.3, Figure F.3). Tissue selenium concentration in the seven remaining collected fish from RG_LIDSL had substantially lower selenium concentrations (5.2 to 9.1 mg/kg) and were all below the biological trigger (Table F.3, Figure F.3).

F4 SUMMARY

Each of the replicates at RG_LCUT, RG_LILC3, and three of five replicates at RG_LIDSL and RG_FO23 were below the %EPT biological trigger. The %EPT results for these mine-exposed areas were consistent with results classified as 'unexpected' in the most recent RAEMP report (Minnow 2020). The biological trigger for benthic invertebrate tissue selenium concentrations was only exceeded in an individual replicate from RG_SLINE in September. The biological trigger exceedance for this replicate does not likely represent the BIT Se concentrations for these areas, as the BIT Se concentration of the remaining replicates for each area were below the threshold. It should be noted that with 20 replicates, one result would be expected to exceed the upper 95th prediction limit by chance. The WCT muscle selenium concentrations at RG_LIDSL exceeded the biological trigger in one of the eight replicates evaluated. Although the cause of the elevated muscle selenium concentrations at RG_LIDSL is currently unknown, it is possible that fish were not confined to the area around RG_LIDSL as these fish can be highly mobile.

The results from the biological triggers evaluation are consistent with the findings of the LCO LAEMP (main report). Current biological triggers were sufficient to identify monitoring areas where biological responses are occurring, based on the integrated assessment conducted in the LAEMP, and no additional triggers are recommended at this time. Uncertainty, however, remains around the cause of the observed %EPT response as well as the elevated WCT Se concentrations in one of the eight replicates at RG_LIDSL. In an effort to resolve uncertainty around the combined and individual effects of water quality, habitat, and other mine-related stressors on benthic invertebrate communities in lotic areas in the Elk River watershed, Minnow is developing a predictive model for benthic invertebrate community endpoints. Uncertainty around the WCT Se concentrations will be further addressed in the RAEMP and through consultation with the Elk Valley Fish and Fish Habitat Monitoring Committee and Teck's Fish Monitoring Team. Uncertainties are expected to be reduced through these efforts, and additional monitoring or potential management responses will continue to be assessed through Teck's adaptive management framework.

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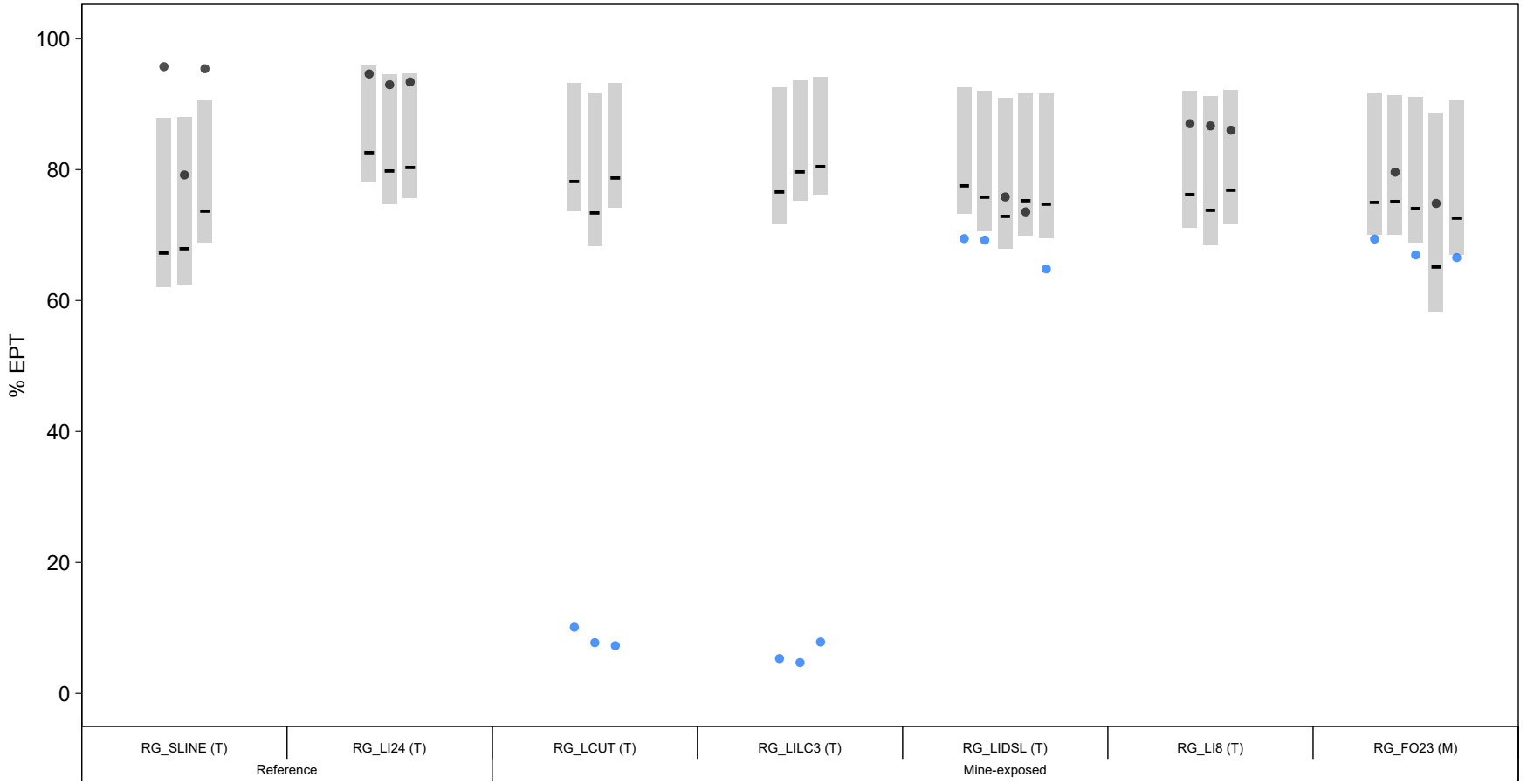

Figure F.1: Biological Trigger Analysis for % EPT Compared to Predicted Values, Line Creek LAEMP, May to December, 2022

Notes: Black bars indicate the lower limit of the predicted ADIT score for the location. Blue dots represent values exceeding the trigger (below 2.5th percentile of NR and below lower limit of predicted ADIT score). Gray shading represents the habitat-adjusted normal range for each replicate. T = Tributary, M = Mainstem.

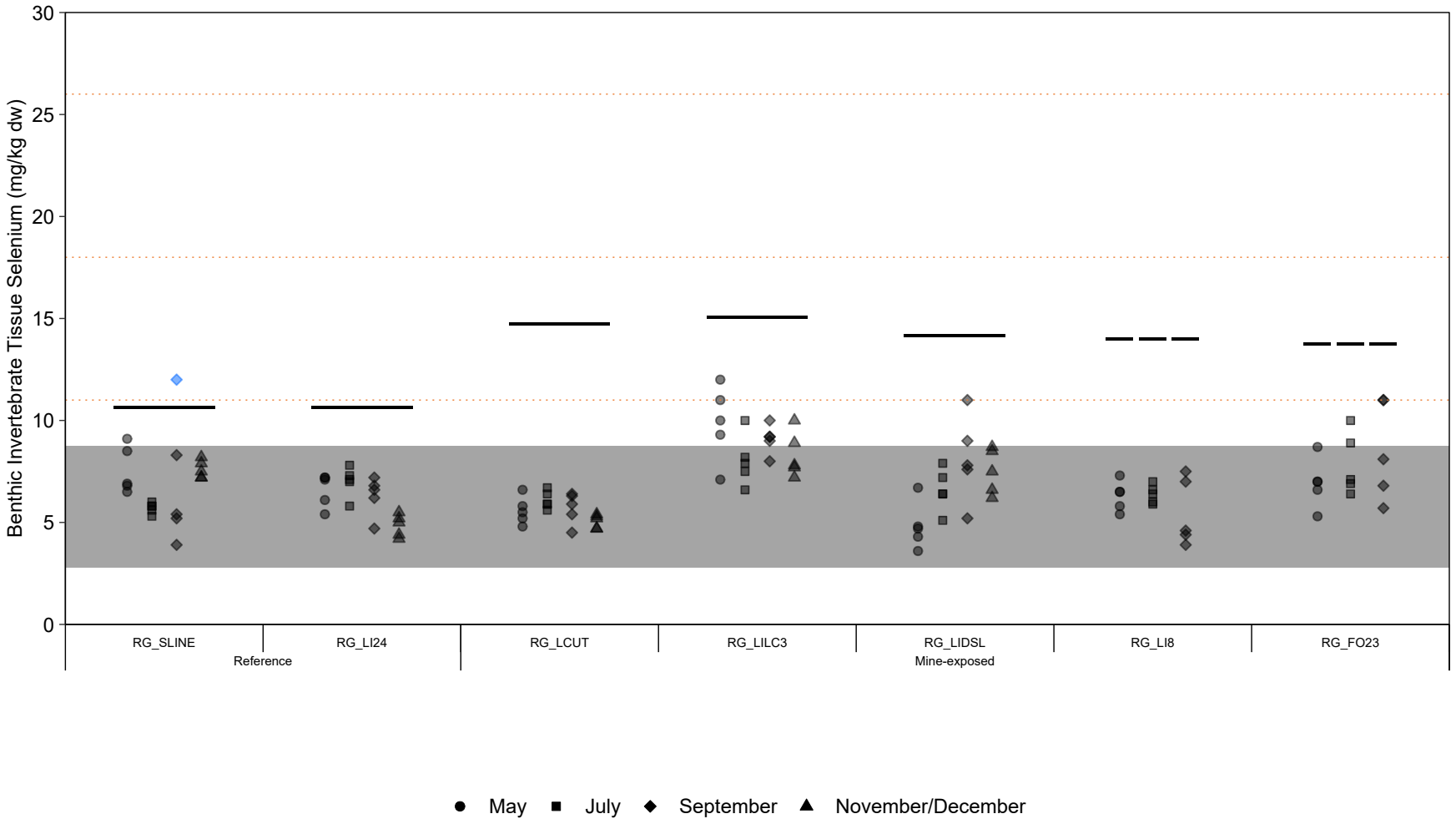

Figure F.2: Selenium Concentrations in Benthic Invertebrate Tissue Samples Compared to Predicted Values, Line Creek LAEMP, 2022

Notes: Black bars indicate the upper 95th prediction interval of the bioaccumulation model. Blue dots represent values exceeding the trigger (above the 97.5th percentile of normal range and above upper 95% prediction interval). Dotted lines indicate EVWQP benchmarks (11, 18, and 26 mg/kg respectively) for juvenile fish. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. T = Tributary, M = Mainstem. Benthic invertebrate tissue samples from RG_LI8 and RG_FO23 were not collected during the December sampling period due to safety concerns.

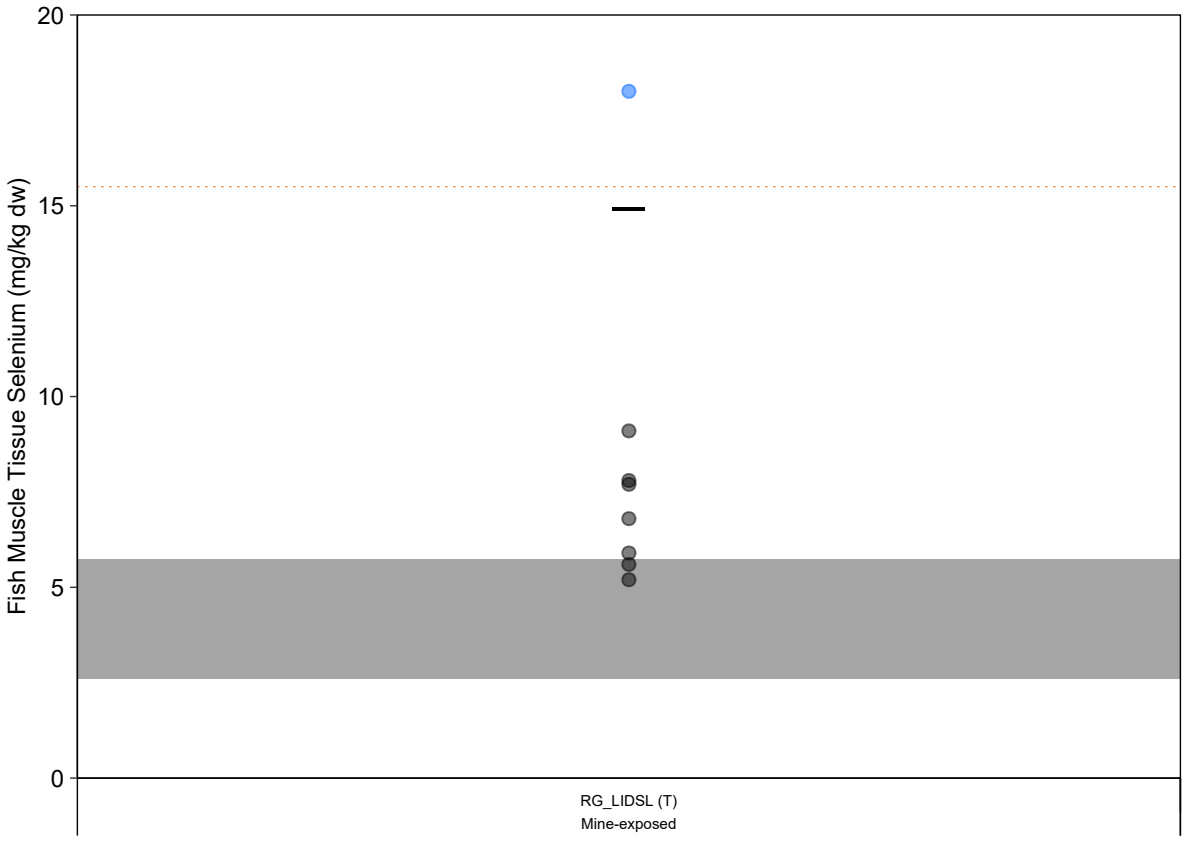

Figure F.3: Selenium Concentrations in Westslop Cutthroat Trout Samples Compared to Predicted Values, Line Creek LAEMP, September 2022

Notes: Black bars indicate the upper 95th prediction interval of the bioaccumulation model. Blue dots represent values exceeding the trigger (above the 97.5th percentile of normal range and above upper 95% prediction interval). Dotted line indicates EVWQP site-specific benchmark (15.5 mg/kg respectively) for juvenile fish. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP.

Table F.1: Biological Trigger Analysis for %EPT in Line Creek LAEMP, September 2022

Waterbody	Exposure	Area	Stream Type	Replicate	Reported Value	ADIT Value	Lower 2.5th Percentile of the Habitat Adjusted Normal Range
Line Creek	Reference	RG_SLINE	T	1	95.7	67.3	62.1
			T	2	79.2	68.0	62.6
			T	3	95.4	73.7	68.8
		RG_LI24	T	1	94.6	82.7	78.1
			T	2	93.0	79.8	74.8
			T	3	93.4	80.4	75.7
	Mine-exposed	RG_LCUT	T	1	10.1	78.2	73.6
			T	2	7.76	73.5	68.4
			T	3	7.30	78.8	74.3
		RG_LILC3	T	1	5.33	76.7	71.8
			T	2	4.71	79.7	75.3
			T	3	7.86	80.5	76.1
		RG_LIDSL	T	1	69.5	77.5	73.3
			T	2	69.2	75.8	70.6
			T	3	75.8	72.9	67.9
			T	4	73.6	75.3	70.0
			T	5	64.8	74.8	69.6
		RG_LI8	T	1	87.0	76.2	71.2
			T	2	86.7	73.8	68.5
			T	3	86.0	76.9	71.8
Fording River	Mine-exposed	RG_FO23	M	1	69.4	75.1	70.1
			M	2	79.6	75.2	70.0
			M	3	67.0	74.0	68.8
			M	4	74.8	65.1	58.3
			M	5	66.6	72.6	67.0

Shaded cells signify those individual replicates that were associated with a biological trigger (i.e. lower than both the ADIT value [as based on predicted water quality] and the lower 2.5th percentile of habitat-adjusted normal range)

Notes: M= Mainstem and T = Tributary. EPT = Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies).

Table F.2: Biological Trigger Analysis for Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples in Line Creek LAEMP, 2022

Waterbody		Stream Type	Area	Date	Predicted Selenium Water Concentration (mg/L)	Benthic Invertebrate Selenium Tissue		
						Upper 95% Prediction Limit (mg/kg dw)	Upper 97.5th Percentile of Normal Range (mg/kg dw)	Reported Concentration (mg/kg dw)
Line Creek	Mine-Exposed	T	RG_SLINE	03-May-22	1.1	10.6	5.3	8.5
		T	RG_SLINE	03-May-22	1.1	10.6	5.3	6.9
		T	RG_SLINE	03-May-22	1.1	10.6	5.3	9.1
		T	RG_SLINE	03-May-22	1.1	10.6	5.3	6.5
		T	RG_SLINE	03-May-22	1.1	10.6	5.3	6.8
		T	RG_SLINE	12-Jul-22	1.1	10.6	5.3	5.8
		T	RG_SLINE	12-Jul-22	1.1	10.6	5.3	5.6
		T	RG_SLINE	12-Jul-22	1.1	10.6	5.3	6.0
		T	RG_SLINE	12-Jul-22	1.1	10.6	5.3	5.3
		T	RG_SLINE	12-Jul-22	1.1	10.6	5.3	5.8
		T	RG_SLINE	16-Sep-22	1.1	10.6	5.3	8.3
		T	RG_SLINE	16-Sep-22	1.1	10.6	5.3	3.9
		T	RG_SLINE	16-Sep-22	1.1	10.6	5.3	5.4
		T	RG_SLINE	16-Sep-22	1.1	10.6	5.3	12.0
		T	RG_SLINE	16-Sep-22	1.1	10.6	5.3	5.2
		T	RG_SLINE	30-Nov-22	1.1	10.6	5.3	7.2
		T	RG_SLINE	30-Nov-22	1.1	10.6	5.3	7.2
		T	RG_SLINE	30-Nov-22	1.1	10.6	5.3	8.2
		T	RG_SLINE	30-Nov-22	1.1	10.6	5.3	7.9
		T	RG_SLINE	30-Nov-22	1.1	10.6	5.3	7.5
		T	RG_LI24	02-May-22	1.1	10.6	5.3	5.4
		T	RG_LI24	02-May-22	1.1	10.6	5.3	7.2
		T	RG_LI24	02-May-22	1.1	10.6	5.3	7.1
		T	RG_LI24	02-May-22	1.1	10.6	5.3	6.1
		T	RG_LI24	02-May-22	1.1	10.6	5.3	7.2
		T	RG_LI24	11-Jul-22	1.1	10.6	5.3	7.1
		T	RG_LI24	11-Jul-22	1.1	10.6	5.3	5.8
		T	RG_LI24	11-Jul-22	1.1	10.6	5.3	7.8
		T	RG_LI24	11-Jul-22	1.1	10.6	5.3	7.0
		T	RG_LI24	11-Jul-22	1.1	10.6	5.3	7.3
		T	RG_LI24	17-Sep-22	1.1	10.6	5.3	6.8
		T	RG_LI24	17-Sep-22	1.1	10.6	5.3	6.2
		T	RG_LI24	17-Sep-22	1.1	10.6	5.3	7.2
		T	RG_LI24	17-Sep-22	1.1	10.6	5.3	6.6
		T	RG_LI24	17-Sep-22	1.1	10.6	5.3	4.7
		T	RG_LI24	30-Nov-22	1.1	10.6	5.3	5.2
		T	RG_LI24	30-Nov-22	1.1	10.6	5.3	5.0
		T	RG_LI24	30-Nov-22	1.1	10.6	5.3	4.4
		T	RG_LI24	30-Nov-22	1.1	10.6	5.3	5.5
		T	RG_LI24	30-Nov-22	1.1	10.6	5.3	4.2
		T	RG_LCUT	02-May-22	104.6	14.7	7.3	5.2
		T	RG_LCUT	02-May-22	104.6	14.7	7.3	4.8
		T	RG_LCUT	02-May-22	104.6	14.7	7.3	5.5
		T	RG_LCUT	02-May-22	104.6	14.7	7.3	5.8
		T	RG_LCUT	02-May-22	104.6	14.7	7.3	6.6

Shaded cells signify those individual replicates that were associated with a biological trigger (i.e. higher than both the upper 95% prediction limit [as based on predicted water quality] and the upper 97.5th percentile of normal range).

Notes: M= Mainstem. T = Tributary. Benthic invertebrate tissue samples from RG_LI8 and RG_FO23 were not collected during the December sampling period due to safety concerns.

Table F.2: Biological Trigger Analysis for Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples in Line Creek LAEMP, 2022

Waterbody		Stream Type	Area	Date	Predicted Selenium Water Concentration (mg/L)	Benthic Invertebrate Selenium Tissue		
						Upper 95% Prediction Limit (mg/kg dw)	Upper 97.5th Percentile of Normal Range (mg/kg dw)	Reported Concentration (mg/kg dw)
Line Creek	Mine-Exposed	T	RG_LCUT	12-Jul-22	104.6	14.7	7.3	5.6
		T	RG_LCUT	12-Jul-22	104.6	14.7	7.3	6.4
		T	RG_LCUT	12-Jul-22	104.6	14.7	7.3	5.9
		T	RG_LCUT	12-Jul-22	104.6	14.7	7.3	5.9
		T	RG_LCUT	12-Jul-22	104.6	14.7	7.3	6.7
		T	RG_LCUT	15-Sep-22	104.6	14.7	7.3	5.9
		T	RG_LCUT	15-Sep-22	104.6	14.7	7.3	5.4
		T	RG_LCUT	15-Sep-22	104.6	14.7	7.3	4.5
		T	RG_LCUT	15-Sep-22	104.6	14.7	7.3	6.4
		T	RG_LCUT	15-Sep-22	104.6	14.7	7.3	6.3
		T	RG_LCUT	01-Dec-22	104.6	14.7	7.3	5.2
		T	RG_LCUT	01-Dec-22	104.6	14.7	7.3	4.7
		T	RG_LCUT	01-Dec-22	104.6	14.7	7.3	5.4
		T	RG_LCUT	01-Dec-22	104.6	14.7	7.3	5.3
		T	RG_LCUT	01-Dec-22	104.6	14.7	7.3	4.7
		T	RG_LILC3	02-May-22	142.2	15.1	7.5	7.1
		T	RG_LILC3	02-May-22	142.2	15.1	7.5	11.0
		T	RG_LILC3	02-May-22	142.2	15.1	7.5	9.3
		T	RG_LILC3	02-May-22	142.2	15.1	7.5	12.0
		T	RG_LILC3	02-May-22	142.2	15.1	7.5	10.0
		T	RG_LILC3	12-Jul-22	142.2	15.1	7.5	10.0
		T	RG_LILC3	12-Jul-22	142.2	15.1	7.5	8.2
		T	RG_LILC3	12-Jul-22	142.2	15.1	7.5	6.6
		T	RG_LILC3	12-Jul-22	142.2	15.1	7.5	7.9
		T	RG_LILC3	12-Jul-22	142.2	15.1	7.5	7.5
		T	RG_LILC3	08-Sep-22	142.2	15.1	7.5	9.2
		T	RG_LILC3	08-Sep-22	142.2	15.1	7.5	8.0
		T	RG_LILC3	08-Sep-22	142.2	15.1	7.5	10.0
		T	RG_LILC3	08-Sep-22	142.2	15.1	7.5	9.0
		T	RG_LILC3	08-Sep-22	142.2	15.1	7.5	9.2
		T	RG_LILC3	01-Dec-22	142.2	15.1	7.5	8.9
		T	RG_LILC3	01-Dec-22	142.2	15.1	7.5	7.8
		T	RG_LILC3	01-Dec-22	142.2	15.1	7.5	7.7
		T	RG_LILC3	01-Dec-22	142.2	15.1	7.5	7.2
		T	RG_LILC3	01-Dec-22	142.2	15.1	7.5	10.0
		T	RG_LIDSL	04-May-22	60.4	14.2	7.0	4.3
		T	RG_LIDSL	04-May-22	60.4	14.2	7.0	4.7
		T	RG_LIDSL	04-May-22	60.4	14.2	7.0	4.8
		T	RG_LIDSL	04-May-22	60.4	14.2	7.0	3.6
		T	RG_LIDSL	04-May-22	60.4	14.2	7.0	6.7
		T	RG_LIDSL	11-Jul-22	60.4	14.2	7.0	6.4
		T	RG_LIDSL	11-Jul-22	60.4	14.2	7.0	5.1
		T	RG_LIDSL	11-Jul-22	60.4	14.2	7.0	7.2
		T	RG_LIDSL	11-Jul-22	60.4	14.2	7.0	6.4
		T	RG_LIDSL	11-Jul-22	60.4	14.2	7.0	7.9

Shaded cells signify those individual replicates that were associated with a biological trigger (i.e. higher than both the upper 95% prediction limit [as based on predicted water quality] and the upper 97.5th percentile of normal range).

Notes: M= Mainstem. T = Tributary. Benthic invertebrate tissue samples from RG_LI8 and RG_FO23 were not collected during the December sampling period due to safety concerns.

Table F.2: Biological Trigger Analysis for Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples in Line Creek LAEMP, 2022

Waterbody		Stream Type	Area	Date	Predicted Selenium Water Concentration (mg/L)	Benthic Invertebrate Selenium Tissue		
						Upper 95% Prediction Limit (mg/kg dw)	Upper 97.5th Percentile of Normal Range (mg/kg dw)	Reported Concentration (mg/kg dw)
Line Creek	Mine-Exposed	T	RG_LIDSL	13-Sep-22	60.4	14.2	7.0	11.0
		T	RG_LIDSL	13-Sep-22	60.4	14.2	7.0	9.0
		T	RG_LIDSL	13-Sep-22	60.4	14.2	7.0	5.2
		T	RG_LIDSL	14-Sep-22	60.4	14.2	7.0	7.6
		T	RG_LIDSL	14-Sep-22	60.4	14.2	7.0	7.8
		T	RG_LIDSL	29-Nov-22	60.4	14.2	7.0	8.5
		T	RG_LIDSL	29-Nov-22	60.4	14.2	7.0	7.5
		T	RG_LIDSL	29-Nov-22	60.4	14.2	7.0	6.2
		T	RG_LIDSL	29-Nov-22	60.4	14.2	7.0	8.7
		T	RG_LIDSL	29-Nov-22	60.4	14.2	7.0	6.6
		T	RG_LI8	04-May-22	52.0	14.0	6.9	6.5
		T	RG_LI8	04-May-22	52.0	14.0	6.9	5.4
		T	RG_LI8	04-May-22	52.0	14.0	6.9	6.5
		T	RG_LI8	04-May-22	52.0	14.0	6.9	5.8
		T	RG_LI8	04-May-22	52.0	14.0	6.9	7.3
		T	RG_LI8	14-Jul-22	52.0	14.0	6.9	6.0
		T	RG_LI8	14-Jul-22	52.0	14.0	6.9	7.0
		T	RG_LI8	14-Jul-22	52.0	14.0	6.9	6.4
		T	RG_LI8	14-Jul-22	52.0	14.0	6.9	5.9
		T	RG_LI8	14-Jul-22	52.0	14.0	6.9	6.6
		T	RG_LI8	17-Sep-22	52.0	14.0	6.9	3.9
		T	RG_LI8	17-Sep-22	52.0	14.0	6.9	4.4
		T	RG_LI8	17-Sep-22	52.0	14.0	6.9	7.5
		T	RG_LI8	17-Sep-22	52.0	14.0	6.9	7.0
		T	RG_LI8	17-Sep-22	52.0	14.0	6.9	4.6
Fording River	Mine-Exposed	M	RG_FO23	04-May-22	39.6	13.7	6.8	7.0
		M	RG_FO23	04-May-22	39.6	13.7	6.8	5.3
		M	RG_FO23	04-May-22	39.6	13.7	6.8	6.6
		M	RG_FO23	04-May-22	39.6	13.7	6.8	7.0
		M	RG_FO23	04-May-22	39.6	13.7	6.8	8.7
		M	RG_FO23	11-Jul-22	39.6	13.7	6.8	7.1
		M	RG_FO23	11-Jul-22	39.6	13.7	6.8	10.0
		M	RG_FO23	11-Jul-22	39.6	13.7	6.8	8.9
		M	RG_FO23	11-Jul-22	39.6	13.7	6.8	6.9
		M	RG_FO23	11-Jul-22	39.6	13.7	6.8	6.4
		M	RG_FO23	09-Sep-22	39.6	13.7	6.8	8.1
		M	RG_FO23	09-Sep-22	39.6	13.7	6.8	5.7
		M	RG_FO23	09-Sep-22	39.6	13.7	6.8	6.8
		M	RG_FO23	09-Sep-22	39.6	13.7	6.8	11.0
		M	RG_FO23	10-Sep-22	39.6	13.7	6.8	11.0

Shaded cells signify those individual replicates that were associated with a biological trigger (i.e. higher than both the upper 95% prediction limit [as based on predicted water quality] and the upper 97.5th percentile of normal range).

Notes: M= Mainstem. T = Tributary. Benthic invertebrate tissue samples from RG_LI8 and RG_FO23 were not collected during the December sampling period due to safety concerns.

Table F.3: Biological Trigger Analysis for Westslope Cutthroat Trout Muscle Selenium Concentrations, Line Creek LAEMP, 2022

Waterbody		Area	Date	Upper 95% Prediction Limit (mg/kg dw)	Westslope Cutthroat Trout Muscle Tissue		
					Upper 95% Prediction Limit (mg/kg dw)	Upper 97.5th Percentile of Normal Range (mg/kg dw)	Reported Concentration (mg/kg dw)
Line Creek	Mine-Exposed	RG_LIDSL	6-Sep-22	60.4	14.9	11.4	5.6
			6-Sep-22	60.4	14.9	11.4	7.7
			6-Sep-22	60.4	14.9	11.4	5.2
			6-Sep-22	60.4	14.9	11.4	7.8
			19-Sep-22	60.4	14.9	11.4	18
			20-Sep-22	60.4	14.9	11.4	9.1
			20-Sep-22	60.4	14.9	11.4	5.9
			20-Sep-22	60.4	14.9	11.4	6.8

Shaded cells signify those individual replicates that were associated with biological trigger (i.e. higher than both the upper 95% prediction limit [as based on predicted water quality] and the upper 97.5th percentile of normal range).

APPENDIX G SUPPORTING INFORMATION

Table G.1: *In Situ* Water Quality Taken at LCO LAEMP Biological Monitoring Areas, September 2022

Field Parameters		Reference		Mine-Exposed							
		RG_SLINE	RG_LI24	RG_LCUT	RG_LILC3	RG_LISP24	RG_LIDSL	RG_LIDCOM	RG_LI8	RG_FRUL	RG_FO23
Station 1	Date	16-Sep-22	17-Sep-22	15-Sep-22	8-Sep-22	14-Sep-22	13-Sep-22	12-Sep-22	17-Sep-22	10-Sep-22	9-Sep-22
	Temperature (°C)	4.5	4.2	6.3	7.2	7.7	7.2	7.9	8	6.6	8.4
	Dissolved Oxygen (mg/L)	11.00	10.91	10.7	92.4	10.44	10.44	10.48	10.51	10.66	10.33
	Dissolved Oxygen (%)	85.1	83.7	87	11.11	87.6	86.7	88.4	89	87.2	88.2
	Conductivity (µS/cm)	209.6	199.4	676	690	595	553	528	506	506	520
	Specific Conductivity (µS/cm)	344.3	330.9	1050	1045	888	837	785	749	784	762
	pH	7.79	7.92	7.64	7.98	8.31	7.91	8.35	8.44	8.50	8.29
Station 2	Date	16-Sep-22	17-Sep-22	15-Sep-22	8-Sep-22	-	13-Sep-22	-	17-Sep-22	10-Sep-22	9-Sep-22
	Temperature (°C)	5.2	4.4	6.8	7.7	-	8.7	-	8	6.7	8.8
	Dissolved Oxygen (mg/L)	10.89	11.08	10.73	10.87	-	10.23	-	10.14	10.75	10.39
	Dissolved Oxygen (%)	85.7	85.5	88.3	91.3	-	88	-	85.4	88.1	89.8
	Conductivity (µS/cm)	212.8	200	650	700	-	578	-	506	510	525
	Specific Conductivity (µS/cm)	342.2	329.9	996	1046	-	839	-	749	784	759
	pH	7.27	7.74	7.83	7.96	-	7.94	-	8.45	8.53	8.35
Station 3	Date	16-Sep-22	17-Sep-22	15-Sep-22	8-Sep-22	-	13-Sep-22	-	17-Sep-22	10-Sep-22	9-Sep-22
	Temperature (°C)	5.5	4.6	6.8	7.9	-	8.7	-	8.4	7.6	10
	Dissolved Oxygen (mg/L)	10.72	10.97	10.62	92.9	-	10.14	-	10.21	10.61	10.13
	Dissolved Oxygen (%)	85	85.1	87.3	10.99	-	87.3	-	86.8	89	89.9
	Conductivity (µS/cm)	214.2	200.8	627	708	-	585	-	510	523	542
	Specific Conductivity (µS/cm)	341.7	328.7	962	1051	-	850	-	748	783	760
	pH	7.52	8.40	7.82	7.94	-	8.31	-	8.26	8.56	8.40
Station 4	Date	-	-	-	-	-	14-Sep-22	-	-	-	9-Sep-22
	Temperature (°C)	-	-	-	-	-	6.9	-	-	-	11.1
	Dissolved Oxygen (mg/L)	-	-	-	-	-	10.36	-	-	-	9.82
	Dissolved Oxygen (%)	-	-	-	-	-	85.3	-	-	-	89.4
	Conductivity (µS/cm)	-	-	-	-	-	583	-	-	-	557
	Specific Conductivity (µS/cm)	-	-	-	-	-	892	-	-	-	760
	pH	-	-	-	-	-	7.70	-	-	-	8.62
Station 5	Date	-	-	-	-	-	14-Sep-22	-	-	-	9-Sep-22
	Temperature (°C)	-	-	-	-	-	7.5	-	-	-	10.6
	Dissolved Oxygen (mg/L)	-	-	-	-	-	10.33	-	-	-	10.06
	Dissolved Oxygen (%)	-	-	-	-	-	86.5	-	-	-	90.6
	Conductivity (µS/cm)	-	-	-	-	-	604	-	-	-	558
	Specific Conductivity (µS/cm)	-	-	-	-	-	907	-	-	-	770
	pH	-	-	-	-	-	7.80	-	-	-	8.78

Notes: "-" = Not sampled.

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_SLINE-1					
9/16/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	2.8	-
2	0	0	0	2.9	-
3	0	0	0	18	-
4	0	0	0	96	-
5	0	0	0	18	-
6	0	0	0	17.2	-
7	0	0	0	3.5	-
8	0	0	0	2.4	-
9	0	0	0	13	-
10	0	0	0	12.2	0.25
11	0	0	0	36	-
12	0	0	0	2.8	-
13	0	0	0	5.2	-
14	0	0	0	11.5	-
15	0	0	0	25.5	-
16	0	0	0	0.2	-
17	0	0	0	1.5	-
18	0	0	0	17.5	-
19	0	0	0	3.2	-
20	0	0	0	10.5	0.25
21	0	0	0	2.7	-
22	0	0	0	22	-
23	0	0	0	0.7	-
24	0	0	0	15.5	-
25	0	0	0	28	-
26	0	0	0	52	-
27	0	0	0	8.4	-
28	0	0	0	17	-
29	0	0	0	10	-
30	0	0	0	9	0.75
31	0	0	0	10.5	-
32	0	0	0	18.5	-
33	0	0	0	51	-
34	0	0	0	18.5	-
35	0	0	0	7.5	-
36	0	0	0	38	-
37	0	0	0	18.8	-
38	0	0	0	1.1	-
39	0	0	0	12.5	-
40	0	0	0	11.5	0.75
41	0	0	0	14.7	-
42	0	0	0	9.2	-
43	0	0	0	1.3	-
44	0	0	0	12.6	-
45	0	0	0	7.2	-
46	0	0	0	28.5	-
47	0	0	0	7.1	-
48	0	0	0	11.2	-
49	0	0	0	10.1	-
50	0	0	0	22.5	0.5
51	0	0	0	11.5	-
52	0	0	0	5.5	-
53	0	0	0	34.5	-
54	0	0	0	26.5	-
55	0	0	0	8.6	-
56	0	0	0	6.5	-
57	0	0	0	4.1	-
58	0	0	0	4.1	-
59	0	0	0	15.8	-
60	0	0	0	1.4	0
61	0	0	0	15	-
62	0	0	0	17	-
63	0	0	0	15.2	-
64	0	0	0	0.4	-
65	0	0	0	17.2	-
66	0	0	0	26	-
67	0	0	0	9.7	-
68	0	0	0	17.5	-
69	0	0	0	12.5	-
70	0	0	0	4.6	0.25
71	0	0	0	7.7	-
72	0	0	0	18	-
73	0	0	0	7.6	-
74	0	0	0	7.9	-
75	0	0	0	16.3	-
76	0	0	0	30	-
77	0	0	0	10	-
78	0	0	0	8.7	-
79	0	0	0	11	-
80	0	0	0	3.5	0
81	0	0	0	10.2	-
82	0	0	0	11.5	-
83	0	0	0	31	-
84	0	0	0	11.6	-
85	0	0	0	23.2	-
86	0	0	0	7.8	-
87	0	0	0	1.9	-
88	0	0	0	11.4	-
89	0	0	0	2.9	-
90	0	0	0	13.8	0.5
91	0	0	0	6.1	-
92	0	0	0	23.2	-
93	0	0	0	24.5	-
94	0	0	0	2.4	-
95	0	0	0	10.5	-
96	0	0	0	2.3	-
97	0	0	0	10	-
98	0	0	0	8.5	-
99	0	0	0	16.5	-
100	0	0	0	2.4	0.5
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.00**	**13.835**	**0.38**
Old Calcite Index (CI) =		**0.00**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_SLINE-2					
9/16/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	16.2	-
2	0	0	0	11.3	-
3	0	0	0	9.5	-
4	0	0	0	5.4	-
5	0	0	0	8.4	-
6	0	0	0	7.3	-
7	0	0	0	3.4	-
8	0	0	0	4.1	-
9	0	0	0	4	-
10	0	0.3	1	11.7	0.25
11	0	0.3	1	23.5	-
12	0	0.2	1	23	-
13	0	0	0	7.6	-
14	0	0	0	4.9	-
15	0	0	0	12.9	-
16	0	0	0	2.7	-
17	0	0.3	1	23.2	-
18	0	0	0	18.5	-
19	0	0	0	12.5	-
20	0	0.2	1	23.5	0.25
21	0	0	0	2.3	-
22	0	0.2	1	26	-
23	0	0	0	5.9	-
24	0	0	0	34	-
25	0	0	0	1.9	-
26	0	0.2	1	15.4	-
27	0	0	0	12.2	-
28	0	0	0	7.2	-
29	0	0	0	8.1	-
30	0	0	0	2.5	0.75
31	0	0	0	6.5	-
32	0	0	0	8.6	-
33	0	0	0	5.5	-
34	0	0	0	19.5	-
35	0	0	0	5.2	-
36	0	0	0	14	-
37	0	0.1	1	10.5	-
38	0	0	0	34	-
39	0	0	0	7.5	-
40	0	0	0	14.9	0.25
41	0	0.1	1	18.1	-
42	0	0	0	12.2	-
43	0	0	0	4.6	-
44	0	0	0	20.9	-
45	0	0	0	12.5	-
46	0	0	0	3.6	-
47	0	0	0	7.6	-
48	0	0	0	8.2	-
49	0	0	0	16.5	-
50	0	0	0	7.1	0.5
51	0	0	0	12.9	-
52	0	0	0	8.2	-
53	0	0	0	12.1	-
54	0	0	0	7.8	-
55	0	0	0	20.5	-
56	0	0	0	10.1	-
57	0	0	0	25.5	-
58	0	0	0	24.5	-
59	0	0	0	15.5	-
60	0	0	0	19	0
61	0	0	0	9.6	-
62	0	0	0	2.9	-
63	0	0	0	10	-
64	0	0	0	12.1	-
65	0	0	0	8.6	-
66	0	0	0	22.5	-
67	0	0	0	15.6	-
68	0	0	0	7.6	-
69	0	0	0	4.1	-
70	0	0	0	8.2	0.25
71	0	0	0	1	-
72	0	0	0	34.5	-
73	0	0	0	10.6	-
74	0	0	0	11.5	-
75	0	0	0	8.2	-
76	0	0	0	6	-
77	0	0	0	21	-
78	0	0.2	1	6.1	-
79	0	0	0	9.7	-
80	0	0.1	1	28	0.75
81	0	0.1	1	10.1	-
82	0	0	0	7	-
83	0	0.1	1	13.9	-
84	0	0	0	5	-
85	0	0.3	1	32	-
86	0	0	0	6	-
87	0	0	0	5.7	-
88	0	0	0	5.2	-
89	0	0	0	7.2	-
90	0	0	0	18.5	0
91	0	0	0	7.1	-
92	0	0.3	1	28.5	-
93	0	0.2	1	11.4	-
94	0	0.1	1	18.7	-
95	0	0	0	4.2	-
96	0	0.3	1	46	-
97	0	0	0	22.5	-
98	0	0	0	12.6	-
99	0	0	0	9.6	-
100	0	0.3	1	20	0.75
Average Cic, Cip and Embed. =	**0.00**	**0.04**	**0.19**	**12.717**	**0.38**
Old Calcite Index (CI) =		**0.19**			
New Calcite Index (CI) =		**0.04**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_SLINE-3					
9/16/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	7.3	-
2	0	0	0	8	-
3	0	0	0	5.6	-
4	0	0	0	7.5	-
5	0	0	0	7.9	-
6	0	0	0	7.4	-
7	0	0	0	9.8	-
8	0	0	0	6.1	-
9	0	0	0	7.6	-
10	0	0	0	17.8	0
11	0	0	0	6.7	-
12	0	0	0	17.1	-
13	0	0	0	4.4	-
14	0	0	0	7.4	-
15	0	0	0	1.4	-
16	0	0	0	7.3	-
17	0	0	0	16.8	-
18	0	0	0	1.3	-
19	0	0	0	2.4	-
20	0	0	0	7.1	0.5
21	0	0	0	4.5	-
22	0	0	0	0.9	-
23	0	0	0	7.6	-
24	0	0	0	14.1	-
25	0	0	0	0.9	-
26	0	0	0	14.4	-
27	0	0	0	9.8	-
28	0	0	0	7.2	-
29	0	0	0	15.2	-
30	0	0	0	7.7	0.25
31	0	0	0	5.4	-
32	0	0	0	4.8	-
33	0	0	0	16.2	-
34	0	0	0	11.6	-
35	0	0	0	8.2	-
36	0	0	0	3.8	-
37	0	0	0	11.2	-
38	0	0	0	12.9	-
39	0	0	0	7.4	-
40	0	0	0	13.7	0.75
41	0	0	0	0.9	-
42	0	0	0	4.9	-
43	0	0	0	13.4	-
44	0	0	0	17.8	-
45	0	0	0	22.4	-
46	0	0	0	3.4	-
47	0	0	0	8.6	-
48	0	0	0	1.8	-
49	0	0	0	8	-
50	0	0	0	9.4	0.25
51	0	0	0	5.7	-
52	0	0	0	7	-
53	0	0	0	13.6	-
54	0	0	0	13.1	-
55	0	0	0	8.1	-
56	0	0	0	12.5	-
57	0	0	0	7.8	-
58	0	0	0	12.7	-
59	0	0	0	6.9	-
60	0	0	0	14.4	0.5
61	0	0	0	7.9	-
62	0	0	0	10	-
63	0	0	0	4.3	-
64	0	0	0	12.3	-
65	0	0	0	3.4	-
66	0	0	0	7.6	-
67	0	0	0	5.3	-
68	0	0	0	8.2	-
69	0	0	0	7.7	-
70	0	0	0	6.8	0.25
71	0	0	0	2.5	-
72	0	0	0	5.5	-
73	0	0	0	4.6	-
74	0	0	0	29.5	-
75	0	0	0	9.8	-
76	0	0	0	0.7	-
77	0	0	0	6.7	-
78	0	0	0	48	-
79	0	0	0	7.8	-
80	0	0	0	6.9	0.25
81	0	0	0	6.7	-
82	0	0	0	6.6	-
83	0	0	0	5.1	-
84	0	0	0	4.6	-
85	0	0	0	6	-
86	0	0	0	8.1	-
87	0	0	0	3.7	-
88	0	0	0	11.4	-
89	0	0	0	6.2	-
90	0	0	0	8.3	0
91	0	0	0	4.6	-
92	0	0	0	6.7	-
93	0	0.2	1	8.1	-
94	0	0	0	7.5	-
95	0	0	0	5.8	-
96	0	0	0	14.8	-
97	0	0	0	6.3	-
98	0	0	0	4.9	-
99	0	0	0	15.8	-
100	0	0	0	5.4	0
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.01**	**8.689**	**0.28**
Old Calcite Index (CI) =		**0.01**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LI24-1					
9/17/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	4.9	-
2	0	0	0	5.5	-
3	0	0	0	8.4	-
4	0	0	0	7	-
5	0	0	0	7.7	-
6	0	0	0	27.5	-
7	0	0	0	9	-
8	0	0	0	7.4	-
9	0	0	0	28	-
10	0	0	0	8.3	0.25
11	0	0	0	5.5	-
12	0	0	0	16.7	-
13	0	0	0	9	-
14	0	0	0	9.3	-
15	0	0	0	1.5	-
16	0	0	0	8	-
17	0	0	0	1.5	-
18	0	0	0	7.3	-
19	0	0	0	10.4	-
20	0	0	0	6.5	0.25
21	0	0	0	38.5	-
22	0	0	0	10.5	-
23	0	0	0	6.3	-
24	0	0	0	5.9	-
25	0	0	0	3.8	-
26	0	0	0	8.5	-
27	0	0	0	22	-
28	0	0	0	7.4	-
29	0	0	0	6	-
30	0	0	0	8.2	0.75
31	0	0	0	14.5	-
32	0	0	0	5.5	-
33	0	0	0	19.7	-
34	0	0	0	7.9	-
35	0	0	0	5.8	-
36	0	0	0	11.5	-
37	0	0	0	22	-
38	0	0	0	6.5	-
39	0	0	0	9.4	-
40	0	0	0	7.4	0.5
41	0	0	0	7.8	-
42	0	0	0	13.7	-
43	0	0	0	3	-
44	0	0	0	12.2	-
45	0	0	0	2.5	-
46	0	0	0	3.5	-
47	0	0	0	12.7	-
48	0	0	0	8.5	-
49	0	0	0	4.8	-
50	0	0	0	4	0.5
51	0	0	0	5.5	-
52	0	0	0	16.2	-
53	0	0	0	9.3	-
54	0	0	0	8.4	-
55	0	0	0	7	-
56	0	0	0	4.2	-
57	0	0	0	3.3	-
58	0	0	0	5.4	-
59	0	0	0	14.5	-
60	0	0	0	7.4	0.25
61	0	0	0	6.4	-
62	0	0	0	6.2	-
63	0	0	0	7.5	-
64	0	0	0	4.4	-
65	0	0	0	5.1	-
66	0	0	0	9	-
67	0	0	0	13	-
68	0	0	0	12.1	-
69	0	0	0	5.9	-
70	0	0	0	8	0
71	0	0	0	12.5	-
72	0	0	0	6	-
73	0	0	0	6.3	-
74	0	0	0	9	-
75	0	0	0	3.2	-
76	0	0	0	5	-
77	0	0	0	17	-
78	0	0	0	16.5	-
79	0	0	0	7.4	-
80	0	0	0	6.8	0.75
81	0	0	0	9.1	-
82	0	0	0	7.4	-
83	0	0	0	9.4	-
84	0	0	0	4.4	-
85	0	0	0	7.2	-
86	0	0	0	13	-
87	0	0	0	5.1	-
88	0	0	0	7.2	-
89	0	0	0	2.5	-
90	0	0	0	5.5	0
91	0	0	0	6.5	-
92	0	0	0	4.4	-
93	0	0	0	4.4	-
94	0	0	0	7.2	-
95	0	0	0	4.6	-
96	0	0	0	10	-
97	0	0	0	10.7	-
98	0	0	0	15	-
99	0	0	0	7.4	-
100	0	0	0	6.5	0.25
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.00**	**8.854**	**0.35**
Old Calcite Index (CI) =		**0.00**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LI24-2					
9/17/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	0.2	-
2	0	0	0	4.7	-
3	0	0	0	1.5	-
4	0	0	0	4.8	-
5	0	0	0	7.4	-
6	0	0	0	4.2	-
7	0	0	0	3.5	-
8	0	0	0	10.4	-
9	0	0	0	6.4	-
10	0	0	0	10.9	0.25
11	0	0	0	5.9	-
12	0	0	0	5.1	-
13	0	0	0	14.7	-
14	0	0	0	12.6	-
15	0	0	0	2.5	-
16	0	0	0	3.6	-
17	0	0	0	14.5	-
18	0	0	0	7.9	-
19	0	0	0	6.2	-
20	0	0	0	19.5	0.25
21	0	0	0	8	-
22	0	0	0	4.6	-
23	0	0	0	12.5	-
24	0	0	0	18.7	-
25	0	0	0	6.4	-
26	0	0	0	2.6	-
27	0	0	0	3.5	-
28	0	0	0	9.1	-
29	0	0	0	4.4	-
30	0	0	0	5.7	0
31	0	0	0	5	-
32	0	0	0	17	-
33	0	0	0	7.3	-
34	0	0	0	21.9	-
35	0	0	0	3.1	-
36	0	0	0	6.7	-
37	0	0	0	20	-
38	0	0	0	15.6	-
39	0	0	0	4.1	-
40	0	0	0	28.2	0.25
41	0	0	0	3.6	-
42	0	0	0	7.5	-
43	0	0	0	9.6	-
44	0	0	0	24.5	-
45	0	0	0	10.3	-
46	0	0	0	4.9	-
47	0	0	0	9.4	-
48	0	0	0	5.1	-
49	0	0	0	8.5	-
50	0	0	0	6.3	0
51	0	0	0	0.4	-
52	0	0	0	10.4	-
53	0	0	0	5.7	-
54	0	0	0	14.4	-
55	0	0	0	1.6	-
56	0	0	0	10.9	-
57	0	0	0	3.6	-
58	0	0	0	5.7	-
59	0	0	0	6.5	-
60	0	0	0	5.4	0
61	0	0	0	3.1	-
62	0	0	0	4.5	-
63	0	0	0	7.3	-
64	0	0	0	5.8	-
65	0	0	0	2.6	-
66	0	0	0	6.3	-
67	0	0	0	11.6	-
68	0	0	0	5.6	-
69	0	0	0	20.7	-
70	0	0	0	6.4	0
71	0	0	0	17	-
72	0	0	0	15.3	-
73	0	0	0	3.5	-
74	0	0	0	14.3	-
75	0	0	0	20.2	-
76	0	0	0	13.9	-
77	0	0	0	6.9	-
78	0	0	0	7	-
79	0	0	0	2.9	-
80	0	0	0	1.4	0.25
81	0	0	0	4.1	-
82	0	0	0	1.1	-
83	0	0	0	4.5	-
84	0	0	0	5.3	-
85	0	0	0	6	-
86	0	0	0	8	-
87	0	0	0	7.1	-
88	0	0	0	4.9	-
89	0	0	0	8.1	-
90	0	0	0	3.5	0.5
91	0	0	0	5.3	-
92	0	0	0	8.6	-
93	0	0	0	4.3	-
94	0	0	0	3.3	-
95	0	0	0	9.6	-
96	0	0	0	1.9	-
97	0	0	0	18.5	-
98	0	0	0	7.9	-
99	0	0	0	7.4	-
100	0	0	0	9.3	0
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.00**	**8.102**	**0.15**
Old Calcite Index (CI) =		**0.00**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LI24-3					
9/17/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	9.4	-
2	0	0	0	11.6	-
3	0	0	0	13.5	-
4	0	0	0	7.4	-
5	0	0	0	19.8	-
6	0	0	0	6.6	-
7	0	0	0	5.3	-
8	0	0	0	8.7	-
9	0	0	0	3.2	-
10	0	0	0	18.6	0.25
11	0	0	0	6.3	-
12	0	0	0	7.9	-
13	0	0	0	59.5	-
14	0	0	0	2.9	-
15	0	0	0	4.4	-
16	0	0	0	16.1	-
17	0	0	0	4.2	-
18	0	0	0	12.9	-
19	0	0	0	5.4	-
20	0	0	0	3.4	0
21	0	0	0	5.1	-
22	0	0	0	25	-
23	0	0	0	7.4	-
24	0	0	0	3.2	-
25	0	0	0	1.7	-
26	0	0	0	10.3	-
27	0	0	0	7.7	-
28	0	0	0	22.2	-
29	0	0	0	7.3	-
30	0	0	0	18.1	0.25
31	0	0	0	2.4	-
32	0	0	0	9.1	-
33	0	0	0	2.3	-
34	0	0	0	1.1	-
35	0	0	0	18	-
36	0	0	0	40.5	-
37	0	0	0	13.1	-
38	0	0	0	2.7	-
39	0	0	0	2.9	-
40	0	0	0	29	0.75
41	0	0	0	6.7	-
42	0	0	0	14.6	-
43	0	0	0	21.2	-
44	0	0	0	9.8	-
45	0	0	0	7.1	-
46	0	0	0	4.3	-
47	0	0	0	4.6	-
48	0	0	0	1.7	-
49	0	0	0	2.6	-
50	0	0	0	3.1	0.25
51	0	0	0	42.4	-
52	0	0	0	1.7	-
53	0	0	0	4.3	-
54	0	0	0	4.7	-
55	0	0	0	8.5	-
56	0	0	0	7.8	-
57	0	0	0	16.1	-
58	0	0	0	3.4	-
59	0	0	0	15.1	-
60	0	0	0	3.8	0
61	0	0	0	5.3	-
62	0	0	0	4.4	-
63	0	0	0	2.9	-
64	0	0	0	3.1	-
65	0	0	0	6.7	-
66	0	0	0	7.7	-
67	0	0	0	4.4	-
68	0	0	0	2.6	-
69	0	0	0	9.2	-
70	0	0	0	4.5	0
71	0	0	0	6.1	-
72	0	0	0	3.9	-
73	0	0	0	10.2	-
74	0	0	0	7.4	-
75	0	0	0	5.4	-
76	0	0	0	4.6	-
77	0	0	0	11.4	-
78	0	0	0	3.9	-
79	0	0	0	11.2	-
80	0	0	0	9.7	0
81	0	0	0	11.1	-
82	0	0	0	3.4	-
83	0	0	0	5.5	-
84	0	0	0	8.9	-
85	0	0	0	5.3	-
86	0	0	0	12.2	-
87	0	0	0	6.7	-
88	0	0	0	9	-
89	0	0	0	8.7	-
90	0	0	0	21.1	0
91	0	0	0	1.6	-
92	0	0	0	2.1	-
93	0	0	0	6.7	-
94	0	0	0	2.3	-
95	0	0	0	3.5	-
96	0	0	0	19.5	-
97	0	0	0	25.5	-
98	0	0	0	4.4	-
99	0	0	0	4.6	-
100	0	0	0	9.1	0
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.00**	**9.355**	**0.15**
Old Calcite Index (CI) =		**0.00**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LCUT-1					
9/15/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0.3	1	7.8	-
2	0	0.8	1	8.7	-
3	0	0	0	6.2	-
4	0	0	0	4.3	-
5	0	0	0	8.4	-
6	0	0.3	1	9	-
7	0	0.5	1	4.9	-
8	0	0.5	1	9.8	-
9	0	0.6	1	6.7	-
10	0	0.6	1	17.8	0.75
11	0	0.6	1	12.6	-
12	0	0	0	6.9	-
13	0	0.4	1	11.4	-
14	0	0.5	1	22.3	-
15	0	0.5	1	4.3	-
16	0	0	0	5.9	-
17	0	0.2	1	3.6	-
18	0	0.4	1	18.7	-
19	0	0.5	1	13.1	-
20	0	0.4	1	8.9	0.5
21	0	0	0	3.4	-
22	0	0.5	1	10.2	-
23	0	0.5	1	9.8	-
24	0	0.6	1	8.2	-
25	0	0	0	5.6	-
26	0	0.3	1	9.5	-
27	0	0.6	1	10.5	-
28	0	0.5	1	29.5	-
29	0	0.6	1	8.9	-
30	0	0.6	1	12	0.5
31	0	0.7	1	8.6	-
32	0	0	0	6.8	-
33	0	0.1	1	11.2	-
34	0	0.6	1	10.6	-
35	0	0.5	1	8.7	-
36	0	0.8	1	13.7	-
37	0	0	0	4.2	-
38	0	0.7	1	15.3	-
39	0	0.5	1	1.8	-
40	0	0.5	1	15.7	0.5
41	0	0.7	1	11.1	-
42	0	0.8	1	20.4	-
43	0	0	0	1.6	-
44	0	0	0	1.3	-
45	0	0.3	1	4.4	-
46	0	0	0	1.9	-
47	0	0.6	1	5.7	-
48	0	0.6	1	9.9	-
49	0	0.8	1	7.3	-
50	0	0.7	1	9.8	0.75
51	0	0.5	1	14.3	-
52	0	0	0	0.9	-
53	0	0.4	1	40	-
54	0	0.3	1	6	-
55	0	0.5	1	8.5	-
56	0	0	0	3.5	-
57	0	0.7	1	15.5	-
58	0	0.8	1	12.2	-
59	0	0.5	1	22.5	-
60	0	0.5	1	13.6	0.25
61	0	0.4	1	3.8	-
62	0	0.4	1	26.5	-
63	0	0	0	1.6	-
64	0	0.6	1	10.5	-
65	0	0.3	1	22.5	-
66	0	0	0	3.9	-
67	0	0	0	22	-
68	0	0.4	1	18.3	-
69	0	0	0	2.5	-
70	0	0.3	1	7	0.25
71	0	0	0	1.3	-
72	0	0.2	1	8.5	-
73	0	0.1	1	4.6	-
74	0	0.3	1	19	-
75	0	0.1	1	4.7	-
76	0	0.2	1	4.6	-
77	0	0.7	1	5.4	-
78	0	0	0	7.2	-
79	0	0.2	1	10.6	-
80	0	0.3	1	5.4	0
81	0	0.5	1	0.3	-
82	0	0.7	1	9.1	-
83	0	0.3	1	2.6	-
84	0	0.1	1	3.7	-
85	0	0.5	1	4.2	-
86	0	0.2	1	6.2	-
87	0	0.6	1	17.9	-
88	0	0.3	1	7.4	-
89	0	0	0	4.8	-
90	0	0.4	1	4.4	0
91	0	0.8	1	18.3	-
92	0	0.9	1	16.4	-
93	0	0	0	1.3	-
94	0	0.6	1	15.3	-
95	0	0	0	3.7	-
96	0	0.6	1	7.9	-
97	0	0.1	1	3.6	-
98	0	0	0	12.7	-
99	0	0	0	2.3	-
100	0	0.5	1	4.9	0.25
Average Cic, Cip and Embed. =	**0.00**	**0.36**	**0.75**	**9.428**	**0.38**
Old Calcite Index (CI) =		**0.75**			
New Calcite Index (CI) =		**0.36**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LCUT-2					
9/15/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	2.7	-
2	0	0	0	0.2	-
3	0	0	0	3.9	-
4	0	0.3	1	20	-
5	0	0	0	3.6	-
6	0	0	0	1.7	-
7	0	0.4	1	6.6	-
8	0	0	0	4.7	-
9	0	0	0	1.6	-
10	0	0.6	1	5.9	0
11	0	0.5	1	17.5	-
12	0	0.4	1	5.7	-
13	0	0.6	1	26	-
14	0	0	0	7.2	-
15	0	0.7	1	28	-
16	0	0.5	1	22	-
17	0	0.4	1	23	-
18	0	0.4	1	20	-
19	0	0.5	1	16.5	-
20	0	0.5	1	20.5	0.5
21	0	0.5	1	18.5	-
22	0	0.5	1	24	-
23	0	0.3	1	24	-
24	0	0.5	1	30	-
25	0	0.4	1	15.8	-
26	0	0.6	1	64	-
27	0	0	0	1.9	-
28	0	0.4	1	54	-
29	0	0.7	1	49	-
30	0	0	0	2.2	0.75
31	0	0.4	1	26	-
32	0	0.7	1	35	-
33	0	0	0	4.7	-
34	0	0	0	0.4	-
35	0	0.6	1	10.2	-
36	0	0.2	1	6.3	-
37	0	0.1	1	5.9	-
38	0	0.3	1	8.6	-
39	0	0	0	5.2	-
40	0	0	0	0.5	0
41	0	0.4	1	16	-
42	0	0	0	2.6	-
43	0	0.2	1	6.9	-
44	0	0	0	4.3	-
45	0	0.3	1	14.3	-
46	0	0.4	1	32	-
47	0	0	0	3.5	-
48	0	0	0	2.1	-
49	0	0.4	1	4.1	-
50	0	0.7	1	29	0.25
51	0	0.5	1	2.1	-
52	0	0	0	15.5	-
53	0	0	0	5.1	-
54	0	0.1	1	6.1	-
55	0	0.8	1	10.7	-
56	0	0	0	5.1	-
57	0	0.3	1	12.5	-
58	0	0.4	1	6.5	-
59	0	0.7	1	38	-
60	0	0.2	1	7	0.75
61	0	0.4	1	8.1	-
62	0	0.4	1	37	-
63	0	0	0	3	-
64	0	0.3	1	16	-
65	0	0	0	4.3	-
66	0	0	0	11.6	-
67	0	0.8	1	9.3	-
68	0	0	0	5.1	-
69	0	0	0	2.1	-
70	0	0	0	1.7	0
71	0	0	0	4.8	-
72	0	0	0	5.4	-
73	0	0.2	1	5.5	-
74	0	0.8	1	13	-
75	0	0.1	1	5	-
76	0	0	0	4.5	-
77	0	0.3	1	12	-
78	0	0	0	3.6	-
79	0	0.2	1	11.5	-
80	0	0	0	3.9	0
81	0	0	0	5.1	-
82	0	0	0	7.9	-
83	0	0	0	4.4	-
84	0	0	0	3.1	-
85	0	0.6	1	15.9	-
86	0	0	0	4.9	-
87	0	0.5	1	15.8	-
88	0	0.4	1	22	-
89	0	0	0	2.1	-
90	0	0.3	1	30.5	0
91	0	0.4	1	47	-
92	0	0	0	2.5	-
93	0	0.4	1	46	-
94	0	0.5	1	21	-
95	0	0	0	5.1	-
96	0	0	0	1.6	-
97	0	0	0	2.3	-
98	0	0	0	13.5	-
99	0	0.6	1	33	-
100	0	0.2	1	13	0.75
Average Cic, Cip and Embed. =	**0.00**	**0.25**	**0.57**	**13.11**	**0.30**
Old Calcite Index (CI) =		**0.57**			
New Calcite Index (CI) =		**0.25**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LCUT-3					
9/15/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0.3	1	14.4	-
2	0	0.1	1	8.9	-
3	0	0.2	1	34	-
4	0	0.5	1	17	-
5	0	0.4	1	9.2	-
6	0	0.6	1	25	-
7	0	0.3	1	9.5	-
8	0	0.1	1	4.2	-
9	0	0.1	1	43	-
10	0	0	0	3.9	0
11	0	0.2	1	9.2	-
12	0	0.4	1	12	-
13	0	0.5	1	14.9	-
14	0	0.3	1	10.9	-
15	0	0.6	1	11.5	-
16	0	0.5	1	13.5	-
17	0	0.7	1	14.5	-
18	0	0.6	1	32	-
19	0	1	1	3.6	-
20	0	0.2	1	12	0.75
21	0	0	0	3.2	-
22	0	0.2	1	3.6	-
23	0	0.1	1	6.8	-
24	0	0.6	1	16.7	-
25	1	0.7	1	13.6	-
26	0	0	0	8	-
27	0	0.6	1	16.2	-
28	0	0	0	11.7	-
29	0	1	1	3.2	-
30	0	0.8	1	3.2	0.5
31	0	0	0	11	-
32	0	0	0	8.4	-
33	0	0	0	6.1	-
34	0	0.7	1	26	-
35	0	0	0	11.5	-
36	0	0.2	1	7.2	-
37	0	0.1	1	6.5	-
38	0	0	0	8.5	-
39	0	0.2	1	11	-
40	0	0	0	1	0
41	0	0	0	8.4	-
42	0	0	0	1.7	-
43	0	0.6	1	11.5	-
44	0	0	0	8.5	-
45	0	0.1	1	4.4	-
46	1	1	1	10	-
47	0	0.5	1	10.1	-
48	0	0.4	1	9.3	-
49	0	0.1	1	3.1	-
50	0	0.8	1	13.4	0
51	0	0.7	1	9.6	-
52	0	0.6	1	7.5	-
53	0	0.8	1	6.1	-
54	0	0	0	1.8	-
55	0	0.5	1	8.5	-
56	0	0.6	1	21.5	-
57	0	0.5	1	6.8	-
58	0	0.2	1	6.3	-
59	1	0.3	1	12.2	-
60	0	0	0	4.5	0
61	2	1	1	11	-
62	0	0.7	1	11.3	-
63	0	0.2	1	23.7	-
64	0	0.6	1	39	-
65	0	0.6	1	31	-
66	0	0	0	0.3	-
67	0	0	0	12.1	-
68	0	0.6	1	35	-
69	0	0.1	1	0.2	-
70	0	0.1	1	5.1	0
71	0	0	0	4.7	-
72	0	0	0	9.5	-
73	0	0	0	8.1	-
74	0	0	0	3.3	-
75	0	0.2	1	9.3	-
76	0	0	0	3.9	-
77	0	0.3	1	7.6	-
78	0	0.2	1	17.5	-
79	0	0	0	6.5	-
80	0	0	0	2.9	0
81	0	0.2	1	7.2	-
82	0	0.5	1	21	-
83	0	0	0	1.6	-
84	0	0	0	5.7	-
85	0	0.7	1	10.8	-
86	0	0.3	1	12.6	-
87	0	0.3	1	11.4	-
88	0	0.4	1	13.2	-
89	0	0.5	1	17.5	-
90	0	0.6	1	13.3	0.25
91	0	0.6	1	15.5	-
92	0	0	0	4.1	-
93	0	0.6	1	16.1	-
94	0	0	0	3.1	-
95	0	0.5	1	24.9	-
96	0	0.4	1	11.2	-
97	0	0.4	1	4.1	-
98	0	0.8	1	9.4	-
99	0	0.1	1	4.7	-
100	0	0	0	1.8	0
Average Cic, Cip and Embed. =	**0.05**	**0.32**	**0.71**	**11.03**	**0.15**
Old Calcite Index (CI) =		**0.76**			
New Calcite Index (CI) =		**0.37**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LILC3-1					
9/8/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0.4	1	15.5	-
2	0	0.6	1	28	-
3	0	0	0	4.5	-
4	0	0.5	1	15	-
5	0	0.3	1	6.5	-
6	0	0.7	1	17.5	-
7	0	0.1	1	3.5	-
8	0	0.5	1	25	-
9	0	0.2	1	8	-
10	0	0.2	1	6.5	0.5
11	0	0.4	1	4.6	-
12	0	0.3	1	5.7	-
13	0	0	0	3	-
14	0	0.2	1	9.5	-
15	0	0.1	1	3.6	-
16	0	0.4	1	7.5	-
17	0	0.5	1	23	-
18	0	0.2	1	7.2	-
19	0	0.4	1	11	-
20	0	0.5	1	17.5	0.75
21	0	0.7	1	18.5	-
22	0	0.1	1	3.3	-
23	0	0.4	1	18	-
24	0	0	0	1.5	-
25	0	0	0	4	-
26	0	0	0	6	-
27	0	0.3	1	6	-
28	0	0.3	1	12	-
29	0	0	0	6.5	-
30	0	0.3	1	7.5	0.5
31	0	0.1	1	6	-
32	0	0.6	1	17	-
33	0	0.4	1	9	-
34	0	0.3	1	9.5	-
35	0	0.5	1	34	-
36	0	0.2	1	8.5	-
37	0	0.3	1	9	-
38	0	0.6	1	13	-
39	0	0	0	3	-
40	0	0.8	1	8.5	0.25
41	0	0	0	0.5	-
42	0	0	0	1.5	-
43	0	0.7	1	23	-
44	0	0	0	7.5	-
45	0	0.1	1	7	-
46	0	0.4	1	35	-
47	0	0	0	3	-
48	0	0	0	6	-
49	0	0.6	1	8.5	-
50	0	0.1	1	8.5	0
51	0	0.7	1	13	-
52	0	0	0	4	-
53	0	0.5	1	15.5	-
54	0	0.2	1	9	-
55	0	0	0	12	-
56	0	0.7	1	12	-
57	0	0.2	1	3.5	-
58	0	0.3	1	3.5	-
59	0	0.6	1	10	-
60	0	0.7	1	8	-
61	0	0.7	1	36	0.75
62	0	0.4	1	9	-
63	0	0.3	1	8	-
64	0	0.2	1	7	-
65	0	0	0	5.5	-
66	0	0	0	7.5	-
67	0	0.7	1	74	-
68	0	0.8	1	18	-
69	0	0.1	1	6.5	-
70	0	0.2	1	6	0.25
71	0	0.7	1	38	-
72	0	0.4	1	7	-
73	0	0.3	1	11	-
74	0	0.2	1	7.5	-
75	0	0.2	1	14	-
76	0	1	1	11	-
77	0	0.4	1	10.5	-
78	0	0.2	1	11	-
79	0	0.7	1	25	-
80	0	0.5	1	9.5	0.25
81	0	0	0	3.5	-
82	0	0	0	1.5	-
83	0	0.8	1	34	-
84	0	0.8	1	10.3	-
85	0	0.3	1	4.7	-
86	0	0.5	1	6	-
87	0	0.3	1	7.5	-
88	0	0.2	1	4.8	-
89	0	0.1	1	10.2	-
90	0	0.6	1	7	0.5
91	0	0.5	1	8	-
92	0	0.3	1	5	-
93	0	0.8	1	5.5	-
94	0	0.3	1	5.7	-
95	0	0	0	7.5	-
96	0	0.4	1	17	-
97	0	0.5	1	7	-
98	0	0.8	1	9.5	-
99	0	0.7	1	13	-
100	0	0.9	1	12	0.25
Average Cic, Cip and Embed. =	**0.00**	**0.35**	**0.81**	**11.161**	**0.40**
Old Calcite Index (CI) =		**0.81**			
New Calcite Index (CI) =		**0.35**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LILC3-2					
9/8/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0.2	1	6	-
2	0	0.4	1	8.5	-
3	0	0.5	1	7.5	-
4	0	0	0	4.6	-
5	0	0.6	1	17.8	-
6	0	0	0	6.6	-
7	0	0.6	1	16.5	-
8	0	0.2	1	6.7	-
9	0	0.8	1	12.3	-
10	0	0.2	1	6.2	-
11	0	0.3	1	19.1	0.25
12	0	0.4	1	13.8	-
13	0	0	0	2.6	-
14	0	0.5	1	16	-
15	0	0.5	1	16.5	-
16	0	0.3	1	5.8	-
17	0	0.2	1	5.5	-
18	0	0.9	1	8.2	-
19	0	0.5	1	12	-
20	0	0.6	1	7.6	0
21	0	0.8	1	7.5	-
22	0	0.1	1	4.5	-
23	0	0.7	1	30	-
24	0	0	0	1.5	-
25	0	0.9	1	17.5	-
26	0	0.7	1	17.5	-
27	0	0.3	1	9	-
28	0	0.4	1	9	-
29	0	0	0	2.2	-
30	0	0.6	1	7.5	0.25
31	0	0.7	1	5	-
32	0	0.1	1	5.5	-
33	0	0.5	1	11	-
34	0	0.9	1	11	-
35	0	0.9	1	15.5	-
36	0	0	0	3	-
37	0	1	1	9.1	-
38	0	0.5	1	8.5	-
39	0	0.5	1	10	-
40	0	0	0	50	0.75
41	0	0	0	3.1	-
42	0	0.5	1	20.4	-
43	0	0.4	1	8.5	-
44	0	0.9	1	13.5	-
45	0	0.9	1	10.5	-
46	0	0	0	1	-
47	0	0.5	1	7.5	-
48	0	0.4	1	12.5	-
49	0	0.7	1	6.5	-
50	0	0.8	1	16	0
51	0	0	0	3.5	-
52	0	0.4	1	14.5	-
53	0	0	0	6.5	-
54	0	0	0	2.8	-
55	0	0.2	1	6.5	-
56	0	0.2	1	7.8	-
57	0	0.4	1	12.5	-
58	0	0.3	1	10	-
59	0	0	0	3	-
60	0	0.1	1	5.3	0.75
61	0	0.3	1	6.7	-
62	0	0.2	1	6.5	-
63	0	0.3	1	6.4	-
64	0	0	0	4.6	-
65	0	0.6	1	19.4	-
66	0	0.6	1	11.7	-
67	0	0.5	1	22	-
68	0	0.3	1	7.5	-
69	0	0.4	1	7.7	-
70	0	0	0	9	0.75
71	0	0.1	1	11.4	-
72	0	0	0	1.8	-
73	0	0.4	1	7.8	-
74	0	0	0	0.8	-
75	0	0	0	3.5	-
76	0	0.4	1	14.8	-
77	0	0.5	1	16	-
78	0	0	0	1.8	-
79	0	0.3	1	13.4	-
80	0	0.4	1	9.5	0
81	0	0.3	1	6.5	-
82	0	0.5	1	7.5	-
83	0	1	1	8.2	-
84	0	1	1	6.7	-
85	0	0.4	1	13.5	-
86	0	0.5	1	2.5	-
87	0	0.7	1	14.5	-
88	0	0.4	1	35	-
89	0	0.4	1	6.5	-
90	0	0.5	1	15.5	0.5
91	0	0.7	1	13.5	-
92	0	0	0	15.5	-
93	0	0	0	3.5	-
94	0	0.3	1	6.5	-
95	0	0	0	4.3	-
96	0	0.1	1	5.6	-
97	0	0.3	1	15	-
98	0	0.3	1	11	-
99	0	0.2	1	10	-
100	0	0.4	1	10.5	0.25
Average Cic, Cip and Embed. =	**0.00**	**0.37**	**0.78**	**10.006**	**0.35**
Old Calcite Index (CI) =		**0.78**			
New Calcite Index (CI) =		**0.37**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LILC3-3					
9/8/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0.3	1	10	-
2	0	0.1	1	6	-
3	0	0.8	1	9.5	-
4	0	0.9	1	9.5	-
5	0	0.5	1	10.7	-
6	0	0.8	1	6.6	-
7	0	0.6	1	4.6	-
8	0	0.7	1	4.9	-
9	0	0.3	1	9.8	-
10	0	0.4	1	9.4	0.75
11	0	0	0	5.4	-
12	0	0.2	1	2.8	-
13	0	0.4	1	7.4	-
14	0	0.6	1	7.4	-
15	0	0.8	1	6.1	-
16	0	0.3	1	9.6	-
17	0	0.7	1	6.4	-
18	0	0.6	1	13.6	-
19	0	0.7	1	5.9	-
20	0	0.4	1	6.7	0.25
21	0	0.7	1	8	-
22	0	0.6	1	8.5	-
23	0	0.5	1	6.2	-
24	0	0.7	1	7.9	-
25	0	0.8	1	10.6	-
26	0	0.7	1	16.7	-
27	0	0.4	1	6.2	-
28	0	0.4	1	8.5	-
29	0	0.4	1	5.5	-
30	0	0.6	1	4.9	0.5
31	0	0.4	1	3.4	-
32	0	0.5	1	3.9	-
33	0	0.7	1	7.6	-
34	0	0.9	1	6.9	-
35	0	0.6	1	11.8	-
36	0	0.9	1	9.7	-
37	0	0.7	1	7.8	-
38	0	0.5	1	17.2	-
39	0	0.6	1	6.1	-
40	0	0.6	1	18.3	0.75
41	0	0.9	1	7.9	-
42	0	0.7	1	12.9	-
43	0	0.8	1	12.7	-
44	0	0.5	1	2.7	-
45	0	0.6	1	4.5	-
46	0	0.7	1	6.6	-
47	0	0.9	1	10.9	-
48	0	0.9	1	7.7	-
49	0	0.8	1	8.2	-
50	0	0.7	1	13.1	0.25
51	0	0.8	1	7.6	-
52	0	0.4	1	4.4	-
53	0	0.8	1	6.4	-
54	0	0.7	1	7.4	-
55	0	0.9	1	12.6	-
56	0	0.1	1	9.2	-
57	0	0.5	1	5.9	-
58	0	0.6	1	8.2	-
59	0	0.8	1	12.7	-
60	0	0.7	1	17.9	0
61	0	0.8	1	6.2	-
62	0	0.8	1	12.4	-
63	0	0.5	1	11.7	-
64	0	0.5	1	17.5	-
65	0	0.4	1	17.9	-
66	0	0.5	1	18.8	-
67	0	0.3	1	7.5	-
68	0	0.6	1	6.8	-
69	0	0.5	1	13.7	-
70	0	0.5	1	13	0.25
71	0	0.7	1	4.9	-
72	0	0.5	1	5.7	-
73	0	0.6	1	22.1	-
74	0	0.8	1	5.5	-
75	0	0.7	1	4.3	-
76	0	0.6	1	14.9	-
77	0	0.4	1	5	-
78	0	0.9	1	12	-
79	0	0.6	1	11.6	-
80	0	0.9	1	10.4	0.75
81	0	0.6	1	14.9	-
82	0	0.4	1	8.6	-
83	0	0.5	1	18.8	-
84	0	0.8	1	7.6	-
85	0	0.7	1	7.8	-
86	0	0.3	1	3.1	-
87	0	0.7	1	6.7	-
88	0	0.8	1	6.4	-
89	0	0.6	1	15.1	-
90	0	1	1	11	0.75
91	0	0.9	1	8.5	-
92	0	0.4	1	12.7	-
93	0	0.5	1	10.7	-
94	0	0.2	1	5	-
95	0	0.9	1	6.1	-
96	0	0.8	1	6.6	-
97	0	0.6	1	8.6	-
98	0	0.4	1	9.9	-
99	0	0.3	1	4.7	-
100	0	0.8	1	11.6	0.25
Average Cic, Cip and Embed. =	**0.00**	**0.60**	**0.99**	**9.138**	**0.45**
Old Calcite Index (CI) =		**0.99**			
New Calcite Index (CI) =		**0.60**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LISP24-1					
9/14/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	11.2	-
2	0	0	0	5.2	-
3	0	0	0	7.8	-
4	0	0.1	1	7.1	-
5	0	0.2	1	9.3	-
6	0	0.1	1	19.5	-
7	0	0	0	6.7	-
8	0	0	0	36	-
9	0	0	0	7.6	-
10	0	0	0	27	0.25
11	0	0	0	8.2	-
12	0	0	0	7.2	-
13	0	0	0	18	-
14	0	0	0	27	-
15	0	0	0	19	-
16	0	0	0	12	-
17	0	0	0	7.2	-
18	0	0	0	4	-
19	0	0	0	8.1	-
20	0	0	0	31	0
21	0	0	0	10.4	-
22	0	0	0	23.5	-
23	0	0	0	28	-
24	0	0	0	14.1	-
25	0	0	0	3.6	-
26	0	0	0	12.8	-
27	0	0	0	15.7	-
28	0	0.1	1	7.6	-
29	0	0	0	6.5	-
30	0	0.1	1	8.2	0
31	0	0	0	8.4	-
32	0	0	0	27.5	-
33	0	0	0	6.3	-
34	0	0	0	11.1	-
35	0	0.1	1	10.2	-
36	0	0	0	16.1	-
37	0	0	0	10.5	-
38	0	0	0	9	-
39	0	0	0	4.1	-
40	0	0	0	15.7	0.5
41	0	0	0	16.5	-
42	0	0	0	19	-
43	0	0	0	9.1	-
44	0	0	0	9.1	-
45	0	0	0	10.3	-
46	0	0	0	8.3	-
47	0	0	0	17.6	-
48	0	0	0	23.5	-
49	0	0	0	9.4	-
50	0	0	0	16.4	0.25
51	0	0	0	11.3	-
52	0	0	0	3.6	-
53	0	0.1	1	11.9	-
54	0	0.1	1	11	-
55	0	0	0	7.7	-
56	0	0	0	16.5	-
57	0	0	0	6.1	-
58	0	0	0	5.6	-
59	0	0	0	6.8	-
60	0	0	0	10.6	0
61	0	0	0	3.5	-
62	0	0	0	29	-
63	0	0	0	39	-
64	0	0	0	12.3	-
65	0	0	0	4.4	-
66	0	0	0	9.7	-
67	0	0.1	1	6.3	-
68	0	0	0	19	-
69	0	0	0	46	-
70	0	0	0	7.1	0.5
71	0	0.1	1	6.2	-
72	0	0	0	12.1	-
73	0	0	0	22	-
74	0	0	0	5.7	-
75	0	0.1	1	11.9	-
76	0	0	0	18	-
77	0	0	0	38	-
78	0	0	0	10.3	-
79	0	0	0	9.3	-
80	0	0.3	1	38	0.25
81	0	0	0	17.6	-
82	0	0.2	1	32	-
83	0	0	0	6.2	-
84	0	0	0	4.2	-
85	0	0	0	9.2	-
86	0	0	0	6.1	-
87	0	0	0	15.5	-
88	0	0	0	8.1	-
89	0	0	0	18	-
90	0	0	0	18	0.75
91	0	0.2	1	5.4	-
92	0	0	0	17	-
93	0	0	0	8.3	-
94	0	0	0	9.2	-
95	0	0	0	22	-
96	0	0	0	5.3	-
97	0	0	0	20	-
98	0	0	0	14.5	-
99	0	0	0	8	-
100	0	0	0	5.1	0
Average Cic, Cip and Embed. =	**0.00**	**0.02**	**0.14**	**13.562**	**0.25**
Old Calcite Index (CI) =		**0.14**			
New Calcite Index (CI) =		**0.02**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LIDSL-1					
9/13/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	6.2	-
2	0	0	0	5.5	-
3	0	0	0	6.2	-
4	0	0	0	5.6	-
5	0	0	0	31	-
6	0	0	0	5.4	-
7	0	0	0	25	-
8	0	0	0	2.7	-
9	0	0	0	4.5	-
10	0	0	0	5.4	0.5
11	0	0	0	15.9	-
12	0	0	0	12	-
13	0	0	0	13.1	-
14	0	0	0	14	-
15	0	0	0	17.9	-
16	0	0	0	5.4	-
17	0	0	0	19	-
18	0	0	0	5.2	-
19	0	0	0	5.3	-
20	0	0	0	5.3	0
21	0	0	0	12	-
22	0	0	0	6.4	-
23	0	0	0	13.8	-
24	0	0	0	8.1	-
25	0	0	0	13.6	-
26	0	0	0	3.3	-
27	0	0	0	11.5	-
28	0	0	0	4	-
29	0	0	0	3.9	-
30	0	0	0	4.4	0
31	0	0	0	4.2	-
32	0	0	0	5.3	-
33	0	0	0	0.4	-
34	0	0	0	8.7	-
35	0	0	0	7.8	-
36	0	0	0	7	-
37	0	0	0	14.5	-
38	0	0	0	0.9	-
39	0	0	0	0.3	-
40	0	0	0	10.1	0.25
41	0	0	0	6.4	-
42	0	0	0	5.9	-
43	0	0	0	3.1	-
44	0	0	0	7.1	-
45	0	0	0	6.4	-
46	0	0	0	15.5	-
47	0	0	0	4.2	-
48	0	0	0	17.2	-
49	0	0	0	7.5	-
50	0	0	0	6.5	0
51	0	0	0	8.1	-
52	0	0	0	22	-
53	0	0	0	5.8	-
54	0	0	0	7.8	-
55	0	0	0	11.9	-
56	0	0	0	5.2	-
57	0	0	0	10	-
58	0	0	0	5.7	-
59	0	0	0	22	-
60	0	0	0	3	0
61	0	0	0	5.1	-
62	0	0	0	27	-
63	0	0	0	25	-
64	0	0	0	6.6	-
65	0	0	0	10.7	-
66	0	0	0	20	-
67	0	0	0	5.3	-
68	0	0	0	2.6	-
69	0	0	0	8.3	-
70	0	0	0	1.2	0
71	0	0	0	6.1	-
72	0	0	0	15.6	-
73	0	0	0	0.4	-
74	0	0	0	6.4	-
75	0	0	0	14.5	-
76	0	0	0	17	-
77	0	0	0	0.6	-
78	0	0	0	7.4	-
79	0	0	0	15.6	-
80	0	0	0	19	0.75
81	0	0	0	1.6	-
82	0	0	0	3.9	-
83	0	0	0	2.6	-
84	0	0	0	14.1	-
85	0	0	0	15	-
86	0	0	0	13.5	-
87	0	0	0	11.5	-
88	0	0	0	9.1	-
89	0	0	0	17	-
90	0	0	0	11.5	0.5
91	0	0	0	4.9	-
92	0	0	0	5.5	-
93	0	0	0	3.4	-
94	0	0	0	10.5	-
95	0	0	0	22.5	-
96	0	0	0	14.5	-
97	0	0	0	19	-
98	0	0	0	8.8	-
99	0	0	0	8.8	-
100	0	0	0	8.4	0.25
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.00**	**9.526**	**0.23**
Old Calcite Index (CI) =		**0.00**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LIDSL-2					
9/13/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	10.2	-
2	0	0	0	5.4	-
3	0	0	0	11.4	-
4	0	0	0	19.1	-
5	0	0	0	0.9	-
6	0	0	0	11.4	-
7	0	0	0	13.5	-
8	0	0	0	28	-
9	0	0	0	22.5	-
10	0	0	0	7.5	0.5
11	0	0	0	41	-
12	0	0	0	11.5	-
13	0	0	0	10.5	-
14	0	0	0	2.2	-
15	0	0	0	28	-
16	0	0	0	20.5	-
17	0	0	0	11.2	-
18	0	0	0	12.1	-
19	0	0	0	6.1	-
20	0	0	0	1.1	0
21	0	0	0	26.5	-
22	0	0	0	0.2	-
23	0	0	0	5.2	-
24	0	0	0	36.5	-
25	0	0	0	23.5	-
26	0	0	0	12.1	-
27	0	0	0	7.1	-
28	0	0	0	6	-
29	0	0	0	14	-
30	0	0	0	16	0.5
31	0	0	0	12.5	-
32	0	0	0	6.5	-
33	0	0	0	5.2	-
34	0	0	0	21.5	-
35	0	0	0	1.1	-
36	0	0	0	3.5	-
37	0	0	0	12.4	-
38	0	0	0	16.5	-
39	0	0	0	5	-
40	0	0	0	16.3	0.25
41	0	0	0	15.5	-
42	0	0	0	13.1	-
43	0	0.1	1	7.1	-
44	0	0	0	11.4	-
45	0	0	0	5.4	-
46	0	0	0	6.1	-
47	0	0.3	1	19.5	-
48	0	0	0	2.4	-
49	0	0	0	12.7	-
50	0	0	0	0.9	0
51	0	0	0	7.5	-
52	0	0	0	10	-
53	0	0.3	1	38	-
54	0	0	0	6.5	-
55	0	0	0	12	-
56	0	0	0	4.5	-
57	0	0.2	1	15.4	-
58	0	0	0	8.4	-
59	0	0	0	0.2	-
60	0	0	0	13	0.75
61	0	0	0	1.5	-
62	0	0	0	6.7	-
63	0	0	0	1.1	-
64	0	0	0	17.7	-
65	0	0	0	2.3	-
66	0	0	0	5	-
67	0	0	0	20.5	-
68	0	0	0	5.7	-
69	0	0	0	13	-
70	0	0	0	19	0
71	0	0	0	12.9	-
72	0	0	0	6	-
73	0	0	0	18	-
74	0	0	0	36	-
75	0	0	0	1.4	-
76	0	0	0	6.6	-
77	0	0	0	8.5	-
78	0	0	0	26	-
79	0	0	0	24	-
80	0	0	0	7.5	0.25
81	0	0	0	12.1	-
82	0	0	0	6.9	-
83	0	0	0	14.8	-
84	0	0	0	24	-
85	0	0	0	15.5	-
86	0	0	0	4.6	-
87	0	0	0	4.5	-
88	0	0	0	8.5	-
89	0	0	0	5.2	-
90	0	0	0	6.7	0.75
91	0	0	0	16.1	-
92	0	0	0	5.2	-
93	0	0	0	15.5	-
94	0	0	0	7.8	-
95	0	0	0	15	-
96	0	0	0	43	-
97	0	0	0	9.2	-
98	0	0	0	10.1	-
99	0	0	0	6.1	-
100	0	0	0	19	0
Average Cic, Cip and Embed. =	**0.00**	**0.01**	**0.04**	**12.205**	**0.30**
Old Calcite Index (CI) =		**0.04**			
New Calcite Index (CI) =		**0.01**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LIDSL-3					
9/13/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	9.2	-
2	0	0	0	5.3	-
3	0	0	0	16	-
4	0	0	0	3.2	-
5	0	0	0	5.5	-
6	0	0	0	20.4	-
7	0	0	0	5.1	-
8	0	0	0	5.6	-
9	0	0	0	4.6	-
10	0	0	0	2.1	0
11	0	0	0	5.5	-
12	0	0	0	14.1	-
13	0	0	0	14	-
14	0	0	0	6.6	-
15	0	0	0	12.1	-
16	0	0	0	4.5	-
17	0	0	0	19	-
18	0	0	0	0.9	-
19	0	0	0	2.6	-
20	0	0	0	31	0
21	0	0	0	17.5	-
22	0	0	0	14.5	-
23	0	0	0	33	-
24	0	0	0	8	-
25	0	0	0	35	-
26	0	0	0	12.5	-
27	0	0	0	21	-
28	0	0	0	9.3	-
29	0	0	0	5.5	-
30	0	0	0	15.2	0.25
31	0	0	0	12.5	-
32	0	0	0	4.4	-
33	0	0	0	17.5	-
34	0	0	0	13	-
35	0	0	0	5.1	-
36	0	0	0	12	-
37	0	0	0	22.5	-
38	0	0	0	43	-
39	0	0	0	11.5	-
40	0	0	0	10.9	0.5
41	0	0	0	7.5	-
42	0	0	0	36	-
43	0	0	0	10.4	-
44	0	0	0	35.5	-
45	0	0	0	9.8	-
46	0	0	0	10.8	-
47	0	0	0	15.5	-
48	0	0	0	15	-
49	0	0	0	43	-
50	0	0	0	23	0.5
51	0	0	0	22	-
52	0	0	0	9.1	-
53	0	0	0	7.9	-
54	0	0	0	9.8	-
55	0	0	0	10.2	-
56	0	0	0	6.8	-
57	0	0	0	6.2	-
58	0	0	0	12.3	-
59	0	0	0	16.3	-
60	0	0	0	1.2	0
61	0	0	0	15.5	-
62	0	0	0	4.3	-
63	0	0	0	17.5	-
64	0	0	0	0.2	-
65	0	0	0	16.5	-
66	0	0	0	15	-
67	0	0	0	35	-
68	0	0	0	7.1	-
69	0	0	0	8.7	-
70	0	0	0	26	0.75
71	0	0	0	7	-
72	0	0	0	22	-
73	0	0	0	38	-
74	0	0	0	5.2	-
75	0	0	0	2.4	-
76	0	0	0	12.4	-
77	0	0	0	13.8	-
78	0	0	0	3.4	-
79	0	0	0	26	-
80	0	0	0	38	0.5
81	0	0	0	1.7	-
82	0	0	0	11.2	-
83	0	0	0	16.9	-
84	0	0	0	12.1	-
85	0	0	0	0.9	-
86	0	0	0	5.1	-
87	0	0.2	1	15.6	-
88	0	0	0	2.6	-
89	0	0	0	15.4	-
90	0	0	0	34	0.25
91	0	0	0	13.1	-
92	0	0	0	4.6	-
93	0	0	0	7.5	-
94	0	0	0	6.2	-
95	0	0	0	16.6	-
96	0	0	0	40.5	-
97	0	0	0	10.8	-
98	0	0	0	15.4	-
99	0	0	0	11.3	-
100	0	0	0	9.6	0.25
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.01**	**13.846**	**0.30**
Old Calcite Index (CI) =		**0.01**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LIDSL-4					
9/14/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	5	-
2	0	0	0	8.2	-
3	0	0	0	8.2	-
4	0	0	0	5.9	-
5	0	0	0	1.9	-
6	0	0	0	43	-
7	0	0	0	3.7	-
8	0	0	0	5	-
9	0	0	0	7.5	-
10	0	0	0	6.5	0.25
11	0	0	0	1.1	-
12	0	0	0	7.8	-
13	0	0	0	13.1	-
14	0	0	0	7	-
15	0	0	0	9.3	-
16	0	0	0	18	-
17	0	0	0	11	-
18	0	0	0	10.4	-
19	0	0	0	42	-
20	0	0	0	28	0
21	0	0	0	6.6	-
22	0	0	0	2.7	-
23	0	0.3	1	46	-
24	0	0	0	14.2	-
25	0	0.4	1	44	-
26	0	0	0	4.5	-
27	0	0	0	2.2	-
28	0	0	0	2.9	-
29	0	0.4	1	19	-
30	0	0	0	3.4	0
31	0	0	0	7.3	-
32	0	0	0	9.3	-
33	0	0	0	16.5	-
34	0	0	0	15	-
35	0	0	0	17.2	-
36	0	0	0	2.7	-
37	0	0	0	11.7	-
38	0	0	0	12.7	-
39	0	0	0	18	-
40	0	0	0	5.1	0
41	0	0	0	8	-
42	0	0	0	7.6	-
43	0	0	0	20	-
44	0	0	0	12.9	-
45	0	0	0	20	-
46	0	0	0	7.9	-
47	0	0	0	12.6	-
48	0	0	0	6.5	-
49	0	0	0	28	-
50	0	0	0	7.6	0.25
51	0	0	0	20	-
52	0	0	0	11	-
53	0	0	0	4.4	-
54	0	0	0	19.3	-
55	0	0	0	13.3	-
56	0	0	0	6.6	-
57	0	0	0	9.3	-
58	0	0	0	3.4	-
59	0	0	0	9	-
60	0	0	0	17	0.5
61	0	0	0	3.1	-
62	0	0	0	7	-
63	0	0	0	14	-
64	0	0	0	4.1	-
65	0	0	0	4.7	-
66	0	0.3	1	52	-
67	0	0	0	12	-
68	0	0	0	7.7	-
69	0	0	0	48	-
70	0	0	0	20.3	0.5
71	0	0.2	1	9.8	-
72	0	0	0	6.5	-
73	0	0	0	7.8	-
74	0	0	0	11	-
75	0	0	0	9.2	-
76	0	0	0	22.5	-
77	0	0	0	15	-
78	0	0	0	7.5	-
79	0	0	0	5	-
80	0	0	0	3.5	0
81	0	0	0	12.3	-
82	0	0	0	4.6	-
83	0	0	0	1.9	-
84	0	0.1	1	28	-
85	0	0	0	14.1	-
86	0	0	0	4.5	-
87	0	0	0	20	-
88	0	0	0	10.8	-
89	0	0	0	4	-
90	0	0	0	31	0
91	0	0	0	25	-
92	0	0	0	10.5	-
93	0	0	0	14.5	-
94	0	0	0	13.9	-
95	0	0	0	16	-
96	0	0	0	8.2	-
97	0	0	0	0.2	-
98	0	0	0	14.5	-
99	0	0	0	5.5	-
100	0	0	0	1.5	0
Average Cic, Cip and Embed. =	**0.00**	**0.02**	**0.06**	**12.597**	**0.15**
Old Calcite Index (CI) =		**0.06**			
New Calcite Index (CI) =		**0.02**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LIDSL-5					
9/14/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	4	-
2	0	0	0	9.1	-
3	0	0	0	6.2	-
4	0	0	0	8.1	-
5	0	0	0	9.5	-
6	0	0	0	8.7	-
7	0	0	0	2.2	-
8	0	0	0	6.1	-
9	0	0	0	10.5	-
10	0	0	0	5.7	0.25
11	0	0.2	1	38	-
12	0	0.3	1	20	-
13	0	0	0	5.3	-
14	0	0	0	4.5	-
15	0	0	0	2.6	-
16	0	0	0	19.5	-
17	0	0	0	4.5	-
18	0	0	0	13	-
19	0	0	0	5.7	-
20	0	0	0	6.5	0
21	0	0	0	14	-
22	0	0	0	6	-
23	0	0	0	19	-
24	0	0	0	11.5	-
25	0	0	0	10.2	-
26	0	0	0	29	-
27	0	0	0	13	-
28	0	0	0	15.8	-
29	0	0	0	2.3	-
30	0	0	0	16.5	0.25
31	0	0	0	5.2	-
32	0	0	0	4.5	-
33	0	0	0	20	-
34	0	0	0	5.9	-
35	0	0	0	5.9	-
36	0	0	0	1.7	-
37	0	0	0	8.6	-
38	0	0	0	11.5	-
39	0	0	0	27	-
40	0	0	0	6	0
41	0	0	0	4.1	-
42	0	0	0	4.6	-
43	0	0	0	10.5	-
44	0	0	0	20	-
45	0	0	0	15	-
46	0	0	0	15	-
47	0	0	0	4.7	-
48	0	0	0	41	-
49	0	0	0	8.5	-
50	0	0	0	10.2	0.5
51	0	0	0	6.3	-
52	0	0	0	25.5	-
53	0	0	0	46	-
54	0	0	0	8.5	-
55	0	0	0	15.3	-
56	0	0	0	7.7	-
57	0	0	0	12.6	-
58	0	0	0	11	-
59	0	0	0	26	-
60	0	0	0	9.9	0
61	0	0	0	12.5	-
62	0	0	0	8.1	-
63	0	0	0	3.5	-
64	0	0.2	1	41	-
65	0	0	0	5.3	-
66	0	0	0	10.9	-
67	0	0	0	4.8	-
68	0	0	0	14.5	-
69	0	0	0	7.6	-
70	0	0	0	14.1	0.5
71	0	0	0	5.4	-
72	0	0	0	21.5	-
73	0	0	0	9.5	-
74	0	0	0	11.5	-
75	0	0	0	22.5	-
76	0	0	0	19.2	-
77	0	0	0	6.3	-
78	0	0	0	4.9	-
79	0	0	0	10	-
80	0	0	0	17.5	0.75
81	0	0	0	4.8	-
82	0	0	0	10.5	-
83	0	0	0	11.2	-
84	0	0	0	16.5	-
85	0	0	0	12.3	-
86	0	0	0	14.8	-
87	0	0	0	9.2	-
88	0	0	0	0.5	-
89	0	0	0	30	-
90	0	0	0	9.5	0.25
91	0	0	0	9.1	-
92	0	0	0	8	-
93	0	0	0	28	-
94	0	0	0	2.1	-
95	0	0	0	3.7	-
96	0	0	0	5.8	-
97	0	0	0	4	-
98	0	0	0	14.2	-
99	0	0	0	6.5	-
100	0	0	0	8	0
Average Cic, Cip and Embed. =	**0.00**	**0.01**	**0.03**	**11.85**	**0.25**
Old Calcite Index (CI) =		**0.03**			
New Calcite Index (CI) =		**0.01**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LIDCOM-1					
9/12/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0.1	1	7.6	-
2	0	0	0	16.4	-
3	0	0	0	6.2	-
4	0	0	0	6.3	-
5	0	0.1	1	10	-
6	0	0	0	9.6	-
7	0	0.1	1	12.6	-
8	0	0	0	2	-
9	0	0	0	5.7	-
10	0	0	0	14.4	0.25
11	0	0	0	9.1	-
12	0	0	0	4.3	-
13	0	0.1	1	16.6	-
14	0	0	0	15.1	-
15	0	0	0	6.6	-
16	0	0	0	17.2	-
17	0	0	0	11	-
18	0	0	0	11.8	-
19	0	0	0	11	-
20	0	0	0	14.6	0
21	0	0	0	22.5	-
22	0	0	0	10.4	-
23	0	0	0	14.5	-
24	0	0	0	13.5	-
25	0	0.1	1	10.5	-
26	0	0	0	9.5	-
27	0	0	0	17.5	-
28	0	0	0	15.7	-
29	0	0	0	9.4	-
30	0	0	0	25.5	0.25
31	0	0	0	13.5	-
32	0	0	0	2.1	-
33	0	0	0	22	-
34	0	0	0	19.5	-
35	0	0	0	4.6	-
36	0	0	0	7.6	-
37	0	0	0	6.3	-
38	0	0	0	8.5	-
39	0	0	0	15.5	-
40	0	0	0	7.6	0.5
41	0	0	0	22	-
42	0	0	0	16.5	-
43	0	0	0	7	-
44	0	0	0	8.7	-
45	0	0	0	14.5	-
46	0	0	0	3.8	-
47	0	0	0	6.3	-
48	0	0	0	16.4	-
49	0	0.1	1	9.5	-
50	0	0	0	0.3	0
51	0	0	0	5.9	-
52	0	0.1	1	5.2	-
53	0	0	0	5	-
54	0	0	0	15.5	-
55	0	0	0	4.8	-
56	0	0	0	13	-
57	0	0	0	21	-
58	0	0	0	12.5	-
59	0	0	0	28	-
60	0	0	0	8.7	0.5
61	0	0	0	3	-
62	0	0	0	5.1	-
63	0	0	0	1.3	-
64	0	0	0	13.5	-
65	0	0	0	2.2	-
66	0	0	0	22.5	-
67	0	0	0	6.5	-
68	0	0	0	5.6	-
69	0	0.1	1	11.1	-
70	0	0.1	1	8.5	0.25
71	0	0	0	0.5	-
72	0	0.1	1	36	-
73	0	0	0	12.6	-
74	0	0	0	12.1	-
75	0	0	0	5.2	-
76	0	0	0	5.3	-
77	0	0	0	4.3	-
78	0	0	0	5.5	-
79	0	0	0	20.5	-
80	0	0	0	19	0
81	0	0	0	2.9	-
82	0	0	0	13	-
83	0	0	0	27	-
84	0	0	0	14.2	-
85	0	0	0	7.1	-
86	0	0	0	15.5	-
87	0	0	0	12.6	-
88	0	0	0	7.8	-
89	0	0	0	0.4	-
90	0	0	0	8.4	0.5
91	0	0	0	10.2	-
92	0	0	0	7.6	-
93	0	0	0	7.9	-
94	0	0.1	1	6.6	-
95	0	0	0	19	-
96	0	0	0	13	-
97	0	0	0	14.2	-
98	0	0	0	5.7	-
99	0	0	0	2.8	-
100	0	0	0	12.2	0.5
Average Cic, Cip and Embed. =	**0.00**	**0.01**	**0.11**	**10.973**	**0.28**
Old Calcite Index (CI) =		**0.11**			
New Calcite Index (CI) =		**0.01**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LI8-1					
9/17/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	11.9	-
2	0	0	0	3.4	-
3	0	0	0	4.2	-
4	0	0	0	27	-
5	0	0	0	8.4	-
6	0	0	0	16.4	-
7	0	0	0	15.6	-
8	0	0	0	11.9	-
9	0	0	0	13.3	-
10	0	0	0	39	0.5
11	0	0	0	5.7	-
12	0	0	0	3.4	-
13	0	0	0	4.2	-
14	0	0	0	17.6	-
15	0	0	0	4.3	-
16	0	0	0	5.1	-
17	0	0	0	26.4	-
18	0	0.2	1	4.4	-
19	0	0	0	4.9	-
20	0	0.1	1	4.6	0
21	0	0.1	1	15.2	-
22	0	0	0	10.6	-
23	0	0	0	8.7	-
24	0	0	0	8.2	-
25	0	0	0	4.3	-
26	0	0	0	8.4	-
27	0	0	0	4.1	-
28	0	0	0	7.6	-
29	0	0	0	4.2	-
30	0	0	0	6.7	0
31	0	0	0	2.3	-
32	0	0	0	21.9	-
33	0	0	0	2.9	-
34	0	0.1	1	10.5	-
35	0	0	0	2.9	-
36	0	0	0	37.7	-
37	0	0	0	3.9	-
38	0	0	0	8.2	-
39	0	0.3	1	7.4	-
40	0	0	0	4.3	0
41	0	0	0	3.4	-
42	0	0	0	3.9	-
43	0	0	0	21	-
44	0	0	0	5.2	-
45	0	0	0	32.7	-
46	0	0	0	6.7	-
47	0	0	0	5.6	-
48	0	0	0	27.5	-
49	0	0	0	13.5	-
50	0	0	0	3.1	0
51	0	0	0	5.9	-
52	0	0.1	1	10.6	-
53	0	0	0	5.2	-
54	0	0	0	4.8	-
55	0	0	0	25.2	-
56	0	0	0	4.9	-
57	0	0	0	3.2	-
58	0	0	0	11.4	-
59	0	0	0	10.7	-
60	0	0	0	20.2	0
61	0	0	0	9.4	-
62	0	0	0	13.9	-
63	0	0	0	22.6	-
64	0	0	0	5.9	-
65	0	0	0	6.3	-
66	0	0	0	5.7	-
67	0	0	0	6.2	-
68	0	0	0	3.4	-
69	0	0	0	6.4	-
70	0	0	0	7.8	0.25
71	0	0	0	4.8	-
72	0	0	0	4.5	-
73	0	0	0	6.2	-
74	0	0.1	1	9.6	-
75	0	0	0	6.7	-
76	0	0.1	1	7.4	-
77	0	0	0	3.4	-
78	0	0	0	9.6	-
79	0	0	0	19.4	-
80	0	0.1	1	9.2	0.25
81	0	0	0	2.4	-
82	0	0	0	7.5	-
83	0	0	0	5.9	-
84	0	0	0	3.8	-
85	0	0	0	7.2	-
86	0	0	0	4.9	-
87	0	0	0	7.8	-
88	0	0	0	5.9	-
89	0	0	0	11.8	-
90	0	0	0	20.2	0.25
91	0	0	0	3.7	-
92	0	0	0	4.8	-
93	0	0	0	10.4	-
94	0	0	0	7.3	-
95	0	0	0	14.4	-
96	0	0	0	5.6	-
97	0	0	0	7.8	-
98	0	0	0	6.2	-
99	0	0	0	3.3	-
100	0	0	0	4.9	0
Average Cic, Cip and Embed. =	**0.00**	**0.01**	**0.09**	**9.506**	**0.13**
Old Calcite Index (CI) =		**0.09**			
New Calcite Index (CI) =		**0.01**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LI8-2					
9/17/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0.2	1	18.5	-
2	0	0	0	6.6	-
3	0	0	0	17.2	-
4	0	0	0	22.5	-
5	0	0	0	8.6	-
6	0	0	0	6.7	-
7	0	0	0	8.2	-
8	0	0	0	15.5	-
9	0	0	0	9.7	-
10	0	0	0	16.8	0.25
11	0	0	0	13	-
12	0	0	0	12.5	-
13	0	0	0	6.1	-
14	0	0	0	3.5	-
15	0	0.3	1	26	-
16	0	0	0	10.4	-
17	0	0	0	11	-
18	0	0	0	9.7	-
19	0	0	0	5.8	-
20	0	0	0	9.6	0.75
21	0	0	0	3.7	-
22	0	0.1	1	7.9	-
23	0	0	0	4.6	-
24	0	0	0	4.3	-
25	0	0	0	5.9	-
26	0	0	0	8.3	-
27	0	0	0	21	-
28	0	0	0	3.2	-
29	0	0	0	9.5	-
30	0	0	0	3.1	0
31	0	0	0	2.1	-
32	0	0	0	21.2	-
33	0	0	0	7.4	-
34	0	0	0	11.3	-
35	0	0	0	36.5	-
36	0	0	0	9.3	-
37	0	0	0	4.5	-
38	0	0	0	11	-
39	0	0	0	13	-
40	0	0	0	34	0.5
41	0	0	0	6.4	-
42	0	0	0	4.1	-
43	0	0	0	6.8	-
44	0	0	0	4.3	-
45	0	0	0	6.6	-
46	0	0	0	15.5	-
47	0	0	0	1.3	-
48	0	0	0	12.9	-
49	0	0.1	1	16.5	-
50	0	0	0	3.5	0
51	0	0	0	25	-
52	0	0	0	4.4	-
53	0	0	0	3.2	-
54	0	0	0	2.4	-
55	0	0	0	13.3	-
56	0	0	0	4	-
57	0	0	0	4.4	-
58	0	0	0	4.2	-
59	0	0	0	32.5	-
60	0	0	0	4	0
61	0	0	0	6	-
62	0	0	0	5.5	-
63	0	0	0	6.2	-
64	0	0	0	15.3	-
65	0	0	0	6.2	-
66	0	0	0	5.2	-
67	0	0	0	2.9	-
68	0	0	0	9.6	-
69	0	0	0	3.9	-
70	0	0	0	5.1	0
71	0	0	0	12	-
72	0	0	0	4.5	-
73	0	0.2	1	33	-
74	0	0	0	7.8	-
75	0	0	0	7.9	-
76	0	0	0	19	-
77	0	0	0	8.1	-
78	0	0	0	1.8	-
79	0	0	0	11.9	-
80	0	0.4	1	30	0.25
81	0	0.3	1	24	-
82	0	0	0	27	-
83	0	0	0	15.3	-
84	0	0	0	10.1	-
85	0	0	0	3.2	-
86	0	0	0	12.3	-
87	0	0.3	1	32	-
88	0	0	0	32.5	-
89	0	0	0	4.8	-
90	0	0	0	8.4	0.5
91	0	0	0	12.2	-
92	0	0	0	17	-
93	0	0	0	12.2	-
94	0	0	0	20.2	-
95	0	0	0	7.1	-
96	0	0	0	9.4	-
97	0	0	0	6.5	-
98	0	0	0	6.2	-
99	0	0	0	6.1	-
100	0	0	0	39	0.5
Average Cic, Cip and Embed. =	**0.00**	**0.02**	**0.08**	**11.424**	**0.28**
Old Calcite Index (CI) =		**0.08**			
New Calcite Index (CI) =		**0.02**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_LI8-3					
9/17/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	7.9	-
2	0	0	0	14.6	-
3	0	0	0	9.4	-
4	0	0	0	8.2	-
5	0	0.3	1	13.3	-
6	0	0	0	12.2	-
7	0	0.2	1	11.7	-
8	0	0	0	8.7	-
9	0	0	0	8.4	-
10	0	0	0	10.9	0
11	0	0	0	5.3	-
12	0	0	0	4.2	-
13	0	0.5	1	25.4	-
14	0	0.2	1	10.5	-
15	0	0	0	8.9	-
16	0	0.1	1	8.2	-
17	0	0	0	3.6	-
18	0	0	0	5.4	-
19	0	0	0	10.7	-
20	0	0.4	1	33	0.25
21	0	0	0	9.4	-
22	0	0	0	2.4	-
23	0	0	0	4.9	-
24	0	0	0	7.8	-
25	0	0	0	9.4	-
26	0	0	0	5.8	-
27	0	0	0	8.6	-
28	0	0	0	5.2	-
29	0	0	0	1.2	-
30	0	0	0	8.7	0
31	0	0	0	26.4	-
32	0	0	0	3.4	-
33	0	0	0	7.8	-
34	0	0	0	6.2	-
35	0	0	0	3.4	-
36	0	0	0	3.9	-
37	0	0	0	3.4	-
38	0	0	0	26.8	-
39	0	0	0	11.2	-
40	0	0	0	5.4	0
41	0	0	0	4.7	-
42	0	0	0	5.2	-
43	0	0	0	8.4	-
44	0	0	0	11.1	-
45	0	0	0	2.3	-
46	0	0	0	16.9	-
47	0	0	0	12.7	-
48	0	0.2	1	37.1	-
49	0	0	0	9.6	-
50	0	0	0	38.1	0.25
51	0	0	0	3.8	-
52	0	0	0	16.4	-
53	0	0	0	9.4	-
54	0	0	0	6.8	-
55	0	0	0	8.2	-
56	0	0	0	7.4	-
57	0	0	0	21.2	-
58	0	0	0	13.3	-
59	0	0	0	4.7	-
60	0	0	0	5.8	0.25
61	0	0	0	12.2	-
62	0	0.2	1	33.6	-
63	0	0	0	14.4	-
64	0	0.3	1	16.9	-
65	0	0	0	7.3	-
66	0	0	0	6.8	-
67	0	0	0	18.2	-
68	0	0	0	10.6	-
69	0	0	0	10.2	-
70	0	0	0	3.9	0
71	0	0.5	1	45.1	-
72	0	0	0	9.7	-
73	0	0.5	1	15.2	-
74	0	0.4	1	14.4	-
75	0	0	0	6.9	-
76	0	0	0	10.6	-
77	0	0	0	6.2	-
78	0	0	0	6.9	-
79	0	0.2	1	19.4	-
80	0	0.3	1	11.1	0.5
81	0	0	0	2.7	-
82	0	0	0	12.2	-
83	0	0	0	8.9	-
84	0	0	0	10.4	-
85	0	0	0	4.5	-
86	0	0	0	13.4	-
87	0	0	0	9.3	-
88	0	0	0	7.3	-
89	0	0	0	5.6	-
90	0	0	0	35	0.5
91	0	0	0	3.7	-
92	0	0	0	6.2	-
93	0	0	0	6.7	-
94	0	0	0	9.8	-
95	0	0	0	20.7	-
96	0	0	0	10.6	-
97	0	0	0	8.2	-
98	0	0	0	9.1	-
99	0	0	0	7.7	-
100	0	0	0	6.4	0
Average Cic, Cip and Embed. =	**0.00**	**0.04**	**0.14**	**11.029**	**0.18**
Old Calcite Index (CI) =		**0.14**			
New Calcite Index (CI) =		**0.04**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_FRUL-1					
9/10/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	6.3	-
2	0	0	0	6.1	-
3	0	0	0	3.1	-
4	0	0	0	8.2	-
5	0	0	0	9.5	-
6	0	0	0	6.2	-
7	0	0	0	4.9	-
8	0	0	0	8.1	-
9	0	0	0	6.9	-
10	0	0	0	2.9	0.25
11	0	0	0	3.9	-
12	0	0	0	8.2	-
13	0	0	0	4.6	-
14	0	0	0	5.8	-
15	0	0	0	0.3	-
16	0	0	0	6.6	-
17	0	0	0	9.5	-
18	0	0	0	11	-
19	0	0	0	5.7	-
20	0	0	0	9.7	0.25
21	0	0	0	2.3	-
22	0	0	0	3.1	-
23	0	0	0	8.2	-
24	0	0	0	10.1	-
25	0	0	0	8.2	-
26	0	0	0	0.9	-
27	0	0	0	2.6	-
28	0	0	0	5.1	-
29	0	0	0	10.5	-
30	0	0	0	13.2	0
31	0	0	0	2.2	-
32	0	0	0	11	-
33	0	0	0	0.2	-
34	0	0	0	8.4	-
35	0	0	0	3.1	-
36	0	0	0	2.6	-
37	0	0	0	8.9	-
38	0	0	0	6.4	-
39	0	0	0	12.5	-
40	0	0	0	4.5	0.25
41	0	0	0	14.8	-
42	0	0	0	2.5	-
43	0	0	0	6.5	-
44	0	0	0	9.4	-
45	0	0	0	9.7	-
46	0	0	0	22	-
47	0	0	0	6.8	-
48	0	0	0	0.4	-
49	0	0	0	10.4	-
50	0	0	0	9.5	0.25
51	0	0	0	7.8	-
52	0	0	0	5.7	-
53	0	0	0	7.6	-
54	0	0	0	7	-
55	0	0	0	8.4	-
56	0	0	0	7.3	-
57	0	0	0	7.5	-
58	0	0	0	21.5	-
59	0	0	0	8.4	-
60	0	0	0	22.8	0.5
61	0	0	0	0.3	-
62	0	0	0	7.5	-
63	0	0	0	5	-
64	0	0	0	37.5	-
65	0	0	0	12.6	-
66	0	0	0	1.2	-
67	0	0	0	0.3	-
68	0	0	0	21	-
69	0	0	0	10.3	-
70	0	0	0	20.2	0.25
71	0	0	0	2.5	-
72	0	0	0	7.4	-
73	0	0	0	12.6	-
74	0	0	0	2.8	-
75	0	0	0	6.7	-
76	0	0	0	3	-
77	0	0	0	20	-
78	0	0	0	4.2	-
79	0	0	0	6.7	-
80	0	0	0	2	0
81	0	0	0	13.5	-
82	0	0	0	2.6	-
83	0	0	0	10.9	-
84	0	0	0	11.6	-
85	0	0	0	1.8	-
86	0	0	0	9.3	-
87	0	0	0	2.6	-
88	0	0	0	2.9	-
89	0	0	0	3.6	-
90	0	0	0	4.5	0
91	0	0	0	5.1	-
92	0	0	0	5.9	-
93	0	0	0	9.5	-
94	0	0	0	8.6	-
95	0	0	0	6.5	-
96	0	0	0	4.9	-
97	0	0	0	4.5	-
98	0	0	0	1.7	-
99	0	0	0	10.1	-
100	0	0	0	4	0
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.00**	**7.554**	**0.18**
Old Calcite Index (CI) =		**0.00**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_FRUL-2					
9/10/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	6.1	-
2	0	0	0	3.2	-
3	0	0	0	3.4	-
4	0	0	0	6.5	-
5	0	0	0	3.8	-
6	0	0	0	3.1	-
7	0	0	0	16.3	-
8	0	0	0	3.8	-
9	0	0	0	8.6	-
10	0	0	0	24	0.25
11	0	0	0	14.3	-
12	0	0	0	7	-
13	0	0	0	13	-
14	0	0	0	0.5	-
15	0	0	0	8.3	-
16	0	0	0	3.1	-
17	0	0	0	0.9	-
18	0	0	0	12.9	-
19	0	0	0	3.8	-
20	0	0	0	3	0.75
21	0	0	0	3.5	-
22	0	0	0	9.2	-
23	0	0	0	1.2	-
24	0	0	0	16	-
25	0	0	0	4	-
26	0	0	0	5.7	-
27	0	0	0	6	-
28	0	0	0	25.5	-
29	0	0	0	9.6	-
30	0	0	0	3.3	0
31	0	0	0	20.5	-
32	0	0	0	14.5	-
33	0	0	0	3.6	-
34	0	0	0	5.7	-
35	0	0	0	11.9	-
36	0	0	0	2.9	-
37	0	0	0	23.5	-
38	0	0	0	4.2	-
39	0	0	0	2.9	-
40	0	0	0	6.1	0
41	0	0	0	10.5	-
42	0	0	0	31	-
43	0	0	0	3.4	-
44	0	0	0	1.5	-
45	0	0	0	16.5	-
46	0	0	0	11	-
47	0	0	0	5.7	-
48	0	0	0	19.5	-
49	0	0	0	5	-
50	0	0	0	2.2	0.25
51	0	0	0	4.7	-
52	0	0	0	4.4	-
53	0	0	0	10.4	-
54	0	0	0	2.3	-
55	0	0	0	5.5	-
56	0	0	0	18.5	-
57	0	0	0	6.6	-
58	0	0	0	13	-
59	0	0	0	6.9	-
60	0	0	0	9.5	0.25
61	0	0	0	2.4	-
62	0	0	0	4.7	-
63	0	0	0	7.3	-
64	0	0	0	6	-
65	0	0	0	6.9	-
66	0	0	0	6.5	-
67	0	0	0	15.5	-
68	0	0	0	5.3	-
69	0	0	0	4.2	-
70	0	0	0	9.3	0
71	0	0	0	1.7	-
72	0	0	0	10.5	-
73	0	0	0	9.6	-
74	0	0	0	4	-
75	0	0	0	18.5	-
76	0	0	0	5.5	-
77	0	0	0	1.3	-
78	0	0	0	0.2	-
79	0	0	0	8.6	-
80	0	0	0	25	0.5
81	0	0	0	3.7	-
82	0	0	0	7.9	-
83	0	0	0	5.2	-
84	0	0	0	5.5	-
85	0	0	0	9.6	-
86	0	0	0	20	-
87	0	0	0	9.4	-
88	0	0	0	1.6	-
89	0	0	0	3.8	-
90	0	0	0	9.2	0.75
91	0	0	0	2.9	-
92	0	0	0	20	-
93	0	0	0	4.9	-
94	0	0	0	7.2	-
95	0	0	0	20	-
96	0	0	0	4.9	-
97	0	0	0	23	-
98	0	0	0	1.5	-
99	0	0	0	3.1	-
100	0	0	0	15.2	0.5
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.00**	**8.451**	**0.33**
Old Calcite Index (CI) =		**0.00**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_FRUL-3					
9/10/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	8.5	-
2	0	0	0	22	-
3	0	0	0	9	-
4	0	0	0	1.4	-
5	0	0	0	11	-
6	0	0	0	38.5	-
7	0	0	0	23	-
8	0	0	0	10	-
9	0	0	0	15.5	-
10	0	0	0	10.7	0
11	0	0	0	11.8	-
12	0	0	0	20	-
13	0	0	0	9.5	-
14	0	0	0	11.8	-
15	0	0	0	4.8	-
16	0	0	0	31	-
17	0	0	0	11.2	-
18	0	0	0	9.9	-
19	0	0	0	1.1	-
20	0	0	0	9.2	0
21	0	0	0	9.1	-
22	0	0	0	14.5	-
23	0	0	0	19	-
24	0	0	0	16	-
25	0	0	0	31	-
26	0	0	0	29	-
27	0	0	0	5.4	-
28	0	0	0	3.6	-
29	0	0	0	5.7	-
30	0	0	0	2.3	0
31	0	0	0	5.4	-
32	0	0	0	15.5	-
33	0	0	0	13.2	-
34	0	0	0	15.6	-
35	0	0	0	12.1	-
36	0	0	0	23.5	-
37	0	0	0	0.4	-
38	0	0	0	16	-
39	0	0	0	0.9	-
40	0	0	0	34	0.5
41	0	0	0	15.3	-
42	0	0	0	7.4	-
43	0	0	0	6.1	-
44	0	0	0	3.2	-
45	0	0	0	5.4	-
46	0	0	0	7.1	-
47	0	0	0	26	-
48	0	0	0	8.5	-
49	0	0	0	19	-
50	0	0	0	8.5	0
51	0	0	0	50	-
52	0	0	0	24.5	-
53	0	0	0	10.6	-
54	0	0	0	7.4	-
55	0	0	0	22	-
56	0	0	0	10.5	-
57	0	0	0	22	-
58	0	0	0	12.2	-
59	0	0	0	2.1	-
60	0	0	0	19	0
61	0	0	0	11.1	-
62	0	0	0	10.7	-
63	0	0	0	33	-
64	0	0	0	9.2	-
65	0	0	0	18	-
66	0	0	0	12.1	-
67	0	0	0	29	-
68	0	0	0	14	-
69	0	0	0	12.5	-
70	0	0	0	4.8	0.25
71	0	0	0	22	-
72	0	0	0	26	-
73	0	0	0	28	-
74	0	0	0	4.7	-
75	0	0	0	12.5	-
76	0	0	0	2	-
77	0	0	0	32	-
78	0	0	0	8	-
79	0	0	0	21	-
80	0	0	0	7	0
81	0	0	0	8.9	-
82	0	0	0	24	-
83	0	0	0	11.5	-
84	0	0	0	10.6	-
85	0	0	0	4.9	-
86	0	0	0	12.4	-
87	0	0	0	4.9	-
88	0	0	0	3	-
89	0	0	0	20.5	-
90	0	0	0	26	0
91	0	0	0	24	-
92	0	0	0	16.8	-
93	0	0	0	1.4	-
94	0	0	0	16.3	-
95	0	0	0	4.4	-
96	0	0	0	4.1	-
97	0	0	0	33	-
98	0	0	0	2.3	-
99	0	0	0	17.5	-
100	0	0	0	9	0.75
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.00**	**14.02**	**0.15**
Old Calcite Index (CI) =		**0.00**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_FO23-1					
9/9/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0.7	1	8.2	-
2	0	1	1	4.2	-
3	0	1	1	3.3	-
4	0	0.7	1	8	-
5	0	0.6	1	26	-
6	0	0	0	6.2	-
7	0	0	0	3.6	-
8	0	0.3	1	30.5	-
9	0	0.2	1	3.5	-
10	0	0.5	1	14.5	0.25
11	0	0.3	1	8.5	-
12	0	0	0	6.6	-
13	0	0	0	3.6	-
14	0	0	0	5.4	-
15	0	0	0	7.7	-
16	0	0	0	3.5	-
17	0	0.3	1	15.6	-
18	0	0	0	2.6	-
19	0	0	0	6.7	-
20	0	0.3	1	8.5	0
21	0	0.7	1	14	-
22	0	0.2	1	7.8	-
23	0	0.3	1	6.9	-
24	0	0	0	0.3	-
25	0	0	0	0.5	-
26	0	0	0	1.4	-
27	0	0.2	1	7.5	-
28	0	0	0	0.5	-
29	0	0	0	1.7	-
30	0	0.3	1	44	0.5
31	0	0.4	1	21	-
32	0	0.1	1	11.2	-
33	0	0.8	1	7.9	-
34	0	0	0	8.5	-
35	0	0.1	1	3.5	-
36	0	0.7	1	28	-
37	0	0.8	1	14	-
38	0	0	0	4.7	-
39	0	0	0	1.7	-
40	0	0	0	5.2	0
41	0	0.1	1	3.5	-
42	0	0	0	3.2	-
43	0	0	0	0.7	-
44	0	0.8	1	20	-
45	0	0	0	3.8	-
46	0	0.3	1	33	-
47	0	0	0	6.5	-
48	0	0.2	1	10.5	-
49	0	0	0	9	-
50	0	0	0	7.5	0
51	0	0.3	1	14	-
52	0	0	0	7.2	-
53	0	0.2	1	37	-
54	0	0	0	0.3	-
55	0	0	0	4.8	-
56	0	0.4	1	17	-
57	0	0	0	10.8	-
58	0	0	0	10	-
59	0	0.1	1	15.6	-
60	0	0.2	1	7.5	0.25
61	0	0.3	1	41	-
62	0	0.5	1	33	-
63	0	0	0	8.5	-
64	0	0	0	9	-
65	0	0	0	10.9	-
66	0	0.1	1	13.5	-
67	0	0	0	4.5	-
68	0	0	0	2.7	-
69	0	0	0	7.8	-
70	0	0.3	1	9.1	0
71	0	0	0	4	-
72	0	0	0	21	-
73	0	0	0	0.3	-
74	0	0	0	1.5	-
75	0	0.4	1	15.3	-
76	0	0	0	8.5	-
77	0	0.5	1	28	-
78	0	0.1	1	9	-
79	0	0	0	4	-
80	0	0.1	1	8	0.75
81	0	0	0	9	-
82	0	0.3	1	32	-
83	0	0	0	3.2	-
84	0	0	0	3.3	-
85	0	0.7	1	8.5	-
86	0	0.3	1	22	-
87	0	0	0	0.4	-
88	0	0.4	1	9	-
89	0	0.5	1	6.4	-
90	1	0.3	1	8.2	0.5
91	0	0	0	8.4	-
92	0	0.4	1	20	-
93	0	0	0	6.3	-
94	0	0.6	1	10.6	-
95	1	0.4	1	7.1	-
96	0	0	0	0.8	-
97	0	0.6	1	30	-
98	0	0.3	1	4.4	-
99	0	0.2	1	6.5	-
100	0	0.1	1	28	0.5
Average Cic, Cip and Embed. =	**0.02**	**0.21**	**0.52**	**10.526**	**0.28**
Old Calcite Index (CI) =		**0.54**			
New Calcite Index (CI) =		**0.23**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_FO23-2					
9/9/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	2.6	-
2	0	0.1	1	14.1	-
3	0	0	0	29	-
4	0	0	0	11	-
5	0	0	0	10.5	-
6	0	0	0	3.1	-
7	0	0.1	1	17	-
8	0	0	0	11.5	-
9	0	0	0	7	-
10	0	0	0	11	0.25
11	0	0	0	3.5	-
12	0	0	0	5.2	-
13	0	0	0	18.5	-
14	0	0	0	8.8	-
15	0	0.2	1	17	-
16	0	0	0	10	-
17	0	0	0	20.5	-
18	0	0	0	5.5	-
19	0	0	0	6.5	-
20	0	0	0	7.5	0
21	0	0	0	3.7	-
22	0	0.1	1	22.5	-
23	0	0	0	6.9	-
24	0	0	0	10.1	-
25	0	0	0	2.9	-
26	0	0	0	5.2	-
27	0	0	0	8.1	-
28	0	0	0	7.3	-
29	0	0	0	22	-
30	0	0	0	7.2	0.75
31	0	0	0	8.6	-
32	0	0.1	1	24.5	-
33	0	0	0	5.7	-
34	0	0	0	4.5	-
35	0	0	0	3.7	-
36	0	0	0	5.4	-
37	0	0.1	1	8.2	-
38	0	0	0	9	-
39	0	0	0	3.2	-
40	0	0	0	7.6	0.25
41	0	0	0	8.3	-
42	0	0	0	3.2	-
43	0	0	0	7.4	-
44	0	0	0	11	-
45	0	0	0	21	-
46	0	0	0	9.5	-
47	0	0	0	9.7	-
48	0	0	0	9.5	-
49	0	0	0	12.9	-
50	0	0	0	18.2	0.25
51	0	0	0	5.2	-
52	0	0	0	8.5	-
53	0	0.1	1	50	-
54	0	0	0	5.7	-
55	0	0	0	7.5	-
56	0	0	0	14.1	-
57	0	0	0	8.2	-
58	0	0	0	12	-
59	0	0	0	11.6	-
60	0	0	0	7.7	0
61	0	0	0	5.9	-
62	0	0	0	8.5	-
63	0	0.1	1	14.5	-
64	0	0	0	7.7	-
65	0	0	0	10.5	-
66	0	0	0	13.5	-
67	0	0	0	14	-
68	0	0	0	8.2	-
69	0	0	0	9.8	-
70	0	0	0	11	0.75
71	0	0.1	1	17.5	-
72	0	0	0	13.2	-
73	0	0	0	10.5	-
74	0	0	0	25	-
75	0	0	0	10.2	-
76	0	0	0	9.1	-
77	0	0	0	18	-
78	0	0	0	13.8	-
79	0	0	0	25	-
80	0	0	0	7.5	0
81	0	0.1	1	22	-
82	0	0	0	19.3	-
83	0	0	0	10.2	-
84	0	0	0	6.8	-
85	0	0	0	14.1	-
86	0	0	0	13.8	-
87	0	0	0	7.2	-
88	0	0	0	45	-
89	0	0	0	8.9	-
90	0	0	0	21	0.5
91	0	0	0	8.3	-
92	0	0	0	14.2	-
93	0	0	0	6.8	-
94	0	0	0	8.4	-
95	0	0	0	6.5	-
96	0	0	0	11.3	-
97	0	0	0	8.1	-
98	0	0	0	6	-
99	0	0	0	8.8	-
100	0	0	0	4.7	0
Average Cic, Cip and Embed. =	**0.00**	**0.01**	**0.10**	**11.421**	**0.28**
Old Calcite Index (CI) =		**0.10**			
New Calcite Index (CI) =		**0.01**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_FO23-3					
9/9/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	1.2	-
2	0	0	0	15.5	-
3	0	0	0	11.3	-
4	0	0	0	9.8	-
5	0	0	0	5.2	-
6	0	0	0	5.7	-
7	0	0	0	3.5	-
8	0	0	0	5	-
9	0	0	0	2.5	-
10	0	0	0	3.8	0
11	0	0	0	2.9	-
12	0	0	0	12.5	-
13	0	0	0	8.9	-
14	0	0	0	7.6	-
15	0	0	0	12.9	-
16	0	0	0	3.6	-
17	0	0	0	17	-
18	0	0	0	28	-
19	0	0	0	6.6	-
20	0	0	0	21	0.75
21	0	0	0	8.9	-
22	0	0	0	5.6	-
23	0	0	0	21.5	-
24	0	0.1	1	27	-
25	0	0	0	19.5	-
26	0	0	0	9.6	-
27	0	0	0	13.6	-
28	0	0	0	9.5	-
29	0	0	0	4.2	-
30	0	0	0	5.7	0.25
31	0	0	0	22	-
32	0	0	0	12.6	-
33	0	0	0	6	-
34	0	0	0	0.3	-
35	0	0	0	6.5	-
36	0	0	0	5.1	-
37	0	0	0	3.2	-
38	0	0	0	7.2	-
39	0	0	0	6.8	-
40	0	0	0	5.2	0
41	0	0	0	4	-
42	0	0	0	19.5	-
43	0	0	0	4.5	-
44	0	0	0	6.2	-
45	0	0	0	4.1	-
46	0	0	0	2	-
47	0	0	0	15	-
48	0	0	0	6	-
49	0	0	0	5.6	-
50	0	0	0	1.4	0
51	0	0	0	22	-
52	0	0	0	2.1	-
53	0	0	0	4.5	-
54	0	0	0	1.1	-
55	0	0	0	4.8	-
56	0	0	0	3.5	-
57	0	0	0	8.6	-
58	0	0	0	10.6	-
59	0	0	0	8.4	-
60	0	0	0	20	0
61	0	0	0	3.4	-
62	0	0	0	12	-
63	0	0	0	5.5	-
64	0	0	0	7.7	-
65	0	0	0	4.1	-
66	0	0	0	20	-
67	0	0	0	6.4	-
68	0	0	0	17.5	-
69	0	0	0	15.2	-
70	0	0	0	18	0.25
71	0	0	0	5.7	-
72	0	0	0	5.6	-
73	0	0	0	18.2	-
74	0	0	0	2.6	-
75	0	0	0	5.3	-
76	0	0	0	15.5	-
77	0	0	0	22	-
78	0	0	0	20	-
79	0	0	0	5	-
80	0	0	0	32	0.25
81	0	0	0	7.9	-
82	0	0	0	19	-
83	0	0	0	22	-
84	0	0	0	14.6	-
85	0	0	0	13.6	-
86	0	0	0	11.1	-
87	0	0	0	1.3	-
88	0	0	0	10.6	-
89	0	0	0	5.6	-
90	0	0	0	1.8	0
91	0	0	0	3.2	-
92	0	0	0	13.2	-
93	0	0	0	9.5	-
94	0	0	0	0.3	-
95	0	0	0	6.4	-
96	0	0	0	6.1	-
97	0	0	0	5.3	-
98	0	0	0	9.4	-
99	0	0	0	10	-
100	0	0	0	0.3	0.75
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.01**	**9.513**	**0.23**
Old Calcite Index (CI) =		**0.01**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_FO23-4					
9/9/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	4.8	-
2	0	0	0	11	-
3	0	0	0	38	-
4	0	0	0	17.5	-
5	0	0	0	4.5	-
6	0	0	0	3.2	-
7	0	0	0	36	-
8	0	0	0	8.7	-
9	0	0	0	10.7	-
10	0	0	0	8.8	0.25
11	0	0	0	11.1	-
12	0	0	0	15.5	-
13	0	0	0	2.4	-
14	0	0	0	5.3	-
15	0	0	0	21.5	-
16	0	0	0	1.2	-
17	0	0	0	27	-
18	0	0	0	7.5	-
19	0	0	0	6.2	-
20	0	0	0	0.7	0
21	0	0	0	6.5	-
22	0	0	0	5	-
23	0	0	0	33	-
24	0	0	0	5.5	-
25	0	0	0	9.2	-
26	0	0	0	0.7	-
27	0	0	0	7.9	-
28	0	0	0	4	-
29	0	0	0	10.5	-
30	0	0	0	30	0.5
31	0	0	0	4.2	-
32	0	0	0	3.8	-
33	0	0	0	18.5	-
34	0	0	0	19	-
35	0	0	0	1.4	-
36	0	0	0	10.5	-
37	0	0	0	1.4	-
38	0	0	0	32	-
39	0	0	0	2.5	-
40	0	0	0	0.7	0
41	0	0	0	10.5	-
42	0	0	0	8.5	-
43	0	0	0	29.5	-
44	0	0	0	13	-
45	0	0	0	32	-
46	0	0	0	5.3	-
47	0	0	0	12.6	-
48	0	0	0	23	-
49	0	0	0	2.2	-
50	0	0	0	10.7	0.5
51	0	0	0	41	-
52	0	0	0	2.9	-
53	0	0	0	6.5	-
54	0	0	0	2.8	-
55	0	0	0	7.2	-
56	0	0	0	6.1	-
57	0	0	0	17	-
58	0	0	0	26	-
59	0	0	0	5.5	-
60	0	0	0	8.1	0
61	0	0	0	12.5	-
62	0	0	0	17.5	-
63	0	0	0	11.2	-
64	0	0	0	6	-
65	0	0	0	20	-
66	0	0	0	14	-
67	0	0	0	31	-
68	0	0	0	0.8	-
69	0	0	0	2.7	-
70	0	0	0	32	0.25
71	0	0	0	3.1	-
72	0	0	0	1.4	-
73	0	0	0	2.3	-
74	0	0	0	9.8	-
75	0	0	0	30.5	-
76	0	0	0	5.3	-
77	0	0	0	5.6	-
78	0	0	0	6	-
79	0	0	0	45	-
80	0	0	0	4	0
81	0	0	0	25	-
82	0	0	0	0.3	-
83	0	0	0	1.1	-
84	0	0	0	40	-
85	0	0	0	2.5	-
86	0	0	0	20	-
87	0	0	0	31.5	-
88	0	0	0	7	-
89	0	0	0	7.1	-
90	0	0	0	5.2	0.25
91	0	0	0	3.2	-
92	0	0	0	20.5	-
93	0	0	0	9.6	-
94	0	0	0	48	-
95	0	0	0	18.2	-
96	0	0	0	0.2	-
97	0	0	0	0.5	-
98	0	0	0	58	-
99	0	0	0	32	-
100	0	0	0	1.4	0
Average Cic, Cip and Embed. =	**0.00**	**0.00**	**0.00**	**13.103**	**0.18**
Old Calcite Index (CI) =		**0.00**			
New Calcite Index (CI) =		**0.00**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.2: Pebble Counts and Calcite Measurements at LCO LAEMP Benthic Invertebrate Sampling Locations, September 2022

RG_FO23-5					
9/9/2022					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	7.6	-
2	0	0	0	4.1	-
3	0	0	0	6.7	-
4	0	0	0	4.1	-
5	0	0	0	6.6	-
6	0	0	0	5.5	-
7	0	0.2	1	11.2	-
8	0	0	0	6.4	-
9	0	0	0	6	-
10	0	0	0	22	0.5
11	0	0	0	26	-
12	0	0	0	1.7	-
13	0	0	0	6.5	-
14	0	0	0	2.6	-
15	0	0.2	1	16.3	-
16	0	0	0	6	-
17	0	0	0	6.8	-
18	0	0	0	9.5	-
19	0	0	0	12.8	-
20	0	0	0	6.9	0
21	0	0	0	6.1	-
22	0	0	0	11.8	-
23	0	0	0	9.1	-
24	0	0	0	20	-
25	0	0.3	1	27	-
26	0	0.3	1	25	-
27	0	0.1	1	39	-
28	0	0.1	1	44	-
29	0	0	0	4.9	-
30	0	0.1	1	26.5	0.75
31	0	0	0	4.6	-
32	0	0	0	3	-
33	0	0	0	6.9	-
34	0	0	0	6.3	-
35	0	0	0	3.6	-
36	0	0	0	5.7	-
37	0	0	0	13	-
38	0	0	0	5.2	-
39	0	0	0	31	-
40	0	0	0	19	0
41	0	0	0	5.7	-
42	0	0	0	21.5	-
43	0	0	0	6.3	-
44	0	0.3	1	32	-
45	0	0	0	4	-
46	0	0	0	8	-
47	0	0	0	19.5	-
48	0	0	0	15.5	-
49	0	0	0	6.2	-
50	0	0	0	25	0.5
51	0	0	0	7.3	-
52	0	0	0	7	-
53	0	0	0	21	-
54	0	0	0	8.6	-
55	0	0	0	30	-
56	0	0	0	16.5	-
57	0	0	0	8.4	-
58	0	0	0	19	-
59	0	0	0	4.9	-
60	0	0	0	19	0
61	0	0	0	11.7	-
62	0	0	0	3	-
63	0	0	0	9.3	-
64	0	0	0	4.1	-
65	0	0	0	7.3	-
66	0	0	0	3.5	-
67	0	0	0	23	-
68	0	0	0	8.7	-
69	0	0	0	6.2	-
70	0	0	0	1.6	0
71	0	0	0	14.5	-
72	0	0	0	12.8	-
73	0	0	0	5.4	-
74	0	0	0	26	-
75	0	0	0	7.3	-
76	0	0	0	28	-
77	0	0	0	5.4	-
78	0	0.2	1	45	-
79	0	0	0	12.2	-
80	0	0	0	5.2	0
81	0	0	0	14.5	-
82	0	0	0	14.7	-
83	0	0	0	19	-
84	0	0	0	10.5	-
85	0	0	0	7.1	-
86	0	0	0	14.3	-
87	0	0	0	4.6	-
88	0	0	0	12.2	-
89	0	0	0	12	-
90	0	0	0	6.6	0.25
91	0	0.2	1	24	-
92	0	0	0	9.5	-
93	0	0	0	4.3	-
94	0	0	0	13	-
95	0	0	0	15	-
96	0	0.3	1	22	-
97	0	0.2	1	37	-
98	0	0	0	16	-
99	0	0	0	10	-
100	0	0	0	2.6	0
Average Cic, Cip and Embed. =	**0.00**	**0.03**	**0.12**	**12.815**	**0.20**
Old Calcite Index (CI) =		**0.12**			
New Calcite Index (CI) =		**0.03**			

Notes: "-" indicates no data. The intermediate axis is the axis on which the subsrate will roll down the stream (measured in cm).

Table G.3: Hess Sample Depth and Flow Information at Areas in Line Creek and Fording River, September 2022

Area	Replicate	Date	Associated K&S Sample	Easting	Northing	Depth (cm)	Flow (m/s)
RG_SLINE	1	16-Sep-22	1	661072	5531421	27	0.333
	2			661077	5531422	20	0.352
	3		2	661148	5531351	20	0.327
	4		3	661178	5531350	21	0.372
	5			661189	5531336	17	0.367
RG_LI24	1	17-Sep-22	1	662087	5538375	24	0.375
	2			662094	5538379	19	0.360
	3		2	662172	5538405	17	0.372
	4		3	662193	5538392	17	0.350
	5			662200	5538387	22	0.363
RG_LILC3	1	8-Sep-22	1	659850	5531717	30	0.486
	2			659857	5531721	27	0.422
	3			659871	5531739	22	0.494
	4			659880	5531753	29	0.415
	5		2	659891	5531773	26	0.428
	6			659894	5531778	21	0.428
	7		3	659927	5531830	20	0.430
	8			659939	5531834	21	0.436
	9			659940	5531851	24	0.496
	10			659945	5531856	19	0.491
RG_LIDSL	1	13-Sep-22	1	659259	5530519	20	0.326
	2			659258	5530528	19	0.373
	3		2	659293	5530581	20	0.373
	4			659300	5530384	19	0.331
	5		3	659321	5530625	25	0.323
	6	14-Sep-22		659317	5530616	21	0.409
	7		4	659342	5530669	17	0.307
	8			659340	5530678	17	0.371
	9		5	659370	5530741	17	0.355
	10			659362	5530732	17	0.386

Table G.4: Supporting Measures Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling for LCO LAEMP, September 2022

Station Parameters		Reference		Mine-Exposed							
		RG_SLINE	RG_LI24	RG_LCUT	RG_LILC3	RG_LISP24	RG_LIDSL	RG_LIDCOM	RG_LI8	RG_FRUL	RG_FO23
Station 1	Date	16-Sep-22	17-Sep-22	15-Sep-22	8-Sep-22	14-Sep-22	13-Sep-22	12-Sep-22	17-Sep-22	10-Sep-22	9-Sep-22
	Easting	661080	662084	660113	659849	659673	659257	658173	655450	654518	652769
	Northing	5531418	5538370	5532141	5531716	5531169	5530530	5529829	5528950	5530129	5528294
	Number of Jars	1	1	1	3	1	1	1	1	1	1
	Total Kick Distance (m)	24	20	16	20	24	22	18	30	16	18
	Full Transect (Yes / No)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
	Number of Transects	7	5	7	2.5	3	1.5	6	3	2	2.5
Station 2	Date	16-Sep-22	17-Sep-22	15-Sep-22	8-Sep-22	-	13-Sep-22	-	17-Sep-22	10-Sep-22	9-Sep-22
	Easting	661132	662165	660108	659893	-	659288	-	655492	654549	652856
	Northing	5531380	5538410	5532155	5531779	-	5530577	-	5528892	5530169	5528378
	Number of Jars	1	1	1	2	-	1	-	1	1	1
	Total Kick Distance (m)	15	15	20	32	-	34	-	36	22	16
	Full Transect (Yes / No)	No	Yes	Yes	Yes	-	Yes	-	Yes	No	No
	Number of Transects	4	6	4	4	-	2.5	-	3	3.5	2.5
Station 3	Date	16-Sep-22	17-Sep-22	15-Sep-22	8-Sep-22	-	13-Sep-22	-	17-Sep-22	10-Sep-22	9-Sep-22
	Easting	661191	662204	660104	659926	-	659321	-	655570	654548	652950
	Northing	5531337	5538393	5532170	5531830	-	5530626	-	5528837	5530252	5528537
	Number of Jars	1	1	1	2	-	1	-	1	1	1
	Total Kick Distance (m)	24	18	20	20	-	32	-	22	24	20
	Full Transect (Yes / No)	Yes	Yes	No	Yes	-	Yes	-	Yes	No	No
	Number of Transects	4	6	7	3	-	4	-	2	4	4
Station 4	Date	-	-	-	-	-	14-Sep-22	-	-	-	9-Sep-22
	Easting	-	-	-	-	-	659345	-	-	-	652929
	Northing	-	-	-	-	-	5530663	-	-	-	5528648
	Number of Jars	-	-	-	-	-	1	-	-	-	1
	Total Kick Distance (m)	-	-	-	-	-	18	-	-	-	25
	Full Transect (Yes / No)	-	-	-	-	-	Yes	-	-	-	No
	Number of Transects	-	-	-	-	-	2.5	-	-	-	4
Station 5	Date	-	-	-	-	-	14-Sep-22	-	-	-	9-Sep-22
	Easting	-	-	-	-	-	659365	-	-	-	652933
	Northing	-	-	-	-	-	5530726	-	-	-	5528766
	Number of Jars	-	-	-	-	-	1	-	-	-	1
	Total Kick Distance (m)	-	-	-	-	-	18	-	-	-	25
	Full Transect (Yes / No)	-	-	-	-	-	Yes	-	-	-	No
	Number of Transects	-	-	-	-	-	2	-	-	-	1

Notes: "-" = Not sampled.

Table G.5: Depth and Velocity Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling at Line Creek and Fording River, September 2022

		Replicate	1	2	3	4	5	Mean
Reference	RG_SLINE							
	1	Depth (cm)	23	26	26	22	20	23
		Velocity (m/s)	0.226	0.269	0.231	0.699	0.279	0.341
		Bankfull Width (m)	6.10					-
		Wetted Width (m)	5.20					-
		Bankfull-Wetted Depth (cm)	40					-
	2	Depth (cm)	37	17	16	7	14	18
		Velocity (m/s)	0.399	0.761	0.298	0.334	0.163	0.391
		Bankfull Width (m)	8.76					-
		Wetted Width (m)	6.64					-
		Bankfull-Wetted Depth (cm)	-					-
	3	Depth (cm)	14	26	36	23	16	23
		Velocity (m/s)	0.388	0.367	0.446	0.306	0.468	0.395
		Bankfull Width (m)	6.97					-
		Wetted Width (m)	5.70					-
		Bankfull-Wetted Depth (cm)	-					-
Reference	RG_LI24							
	1	Depth (cm)	7	14	18	9	7	11
		Velocity (m/s)	0.071	0.184	0.272	0.253	0.036	0.163
		Bankfull Width (m)	6.75					-
		Wetted Width (m)	5.25					-
		Bankfull-Wetted Depth (cm)	16					-
	2	Depth (cm)	14	10	15	24	19	16
		Velocity (m/s)	0.147	0.273	0.370	0.705	0.504	0.400
		Bankfull Width (m)	11.00					-
		Wetted Width (m)	6.20					-
		Bankfull-Wetted Depth (cm)	-					-
	3	Depth (cm)	17	22	15	14	13	16
		Velocity (m/s)	0.361	0.182	0.561	0.034	0.167	0.261
		Bankfull Width (m)	7.30					-
		Wetted Width (m)	3.10					-
		Bankfull-Wetted Depth (cm)	-					-
Mine-Exposed	RG_LCUT							
	1	Depth (cm)	30	28	31	22	21	26
		Velocity (m/s)	0.947	0.801	0.793	0.449	0.860	0.770
		Bankfull Width (m)	8.8					-
		Wetted Width (m)	4.5					-
		Bankfull-Wetted Depth (cm)	29					-
	2	Depth (cm)	34	36	27	23	26	29
		Velocity (m/s)	0.386	0.747	0.614	0.439	0.137	0.465
		Bankfull Width (m)	7.21					-
		Wetted Width (m)	6.95					-
		Bankfull-Wetted Depth (cm)	-					-
	3	Depth (cm)	23	23	21	13	20	20
		Velocity (m/s)	0.703	0.555	0.610	0.716	0.222	0.561
		Bankfull Width (m)	8.13					-
		Wetted Width (m)	7.82					-
		Bankfull-Wetted Depth (cm)	-					-

Notes: "-" = Not sampled.

Table G.5: Depth and Velocity Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling at Line Creek and Fording River, September 2022

		Replicate	1	2	3	4	5	Mean
Mine-Exposed	RG_LILC3							
	1	Depth (cm)	34	28	20	16	20	24
		Velocity (m/s)	0.613	1.528	1.683	0.997	0.672	1.099
		Bankfull Width (m)	8.70					-
		Wetted Width (m)	7.16					-
		Bankfull-Wetted Depth (cm)	-					-
	2	Depth (cm)	24	32	37	31	32	31
		Velocity (m/s)	0.121	0.574	0.648	0.713	0.767	0.565
		Bankfull Width (m)	7.40					-
		Wetted Width (m)	6.35					-
		Bankfull-Wetted Depth (cm)	-					-
	3	Depth (cm)	15	10	22	37	33	23
		Velocity (m/s)	0.925	0.591	0.567	0.943	0.705	0.746
		Bankfull Width (m)	8.20					-
		Wetted Width (m)	8.05					-
		Bankfull-Wetted Depth (cm)	0.25					-
Mine-Exposed	RG_LISP24							
	1	Depth (cm)	32	37	30	34	24	31
		Velocity (m/s)	0.442	0.876	0.553	0.684	0.282	0.567
		Bankfull Width (m)	10.90					-
		Wetted Width (m)	10.15					-
		Bankfull-Wetted Depth (cm)	25					-
Mine-Exposed	RG_LIDSL							
	1	Depth (cm)	36	28	27	20	15	25
		Velocity (m/s)	0.382	0.694	0.598	0.609	0.893	0.635
		Bankfull Width (m)	12.25					-
		Wetted Width (m)	11.95					-
		Bankfull-Wetted Depth (cm)	26					-
	2	Depth (cm)	29	33	25	32	13	26
		Velocity (m/s)	0.255	0.678	0.553	0.751	0.187	0.485
		Bankfull Width (m)	15.25					-
		Wetted Width (m)	15.20					-
		Bankfull-Wetted Depth (cm)	-					-
	3	Depth (cm)	35	41	42	41	22	36
		Velocity (m/s)	0.708	1.028	0.457	0.587	0.476	0.651
		Bankfull Width (m)	8.10					-
		Wetted Width (m)	7.40					-
		Bankfull-Wetted Depth (cm)	-					-
	4	Depth (cm)	31	41	36	32	26	33
		Velocity (m/s)	0.434	0.637	0.398	0.555	0.704	0.546
		Bankfull Width (m)	10.90					-
		Wetted Width (m)	9.55					-
		Bankfull-Wetted Depth (cm)	-					-
	5	Depth (cm)	31	26	44	26	34	32
		Velocity (m/s)	0.372	0.795	0.685	0.978	0.732	0.712
		Bankfull Width (m)	10.10					-
		Wetted Width (m)	9.40					-
		Bankfull-Wetted Depth (cm)	-					-

Notes: "-" = Not sampled.

Table G.5: Depth and Velocity Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling at Line Creek and Fording River, September 2022

	Replicate		1	2	3	4	5	Mean
Mine-Exposed	RG_LIDCOM							
	1	Depth (cm)	35	32	17	33	31	30
		Velocity (m/s)	0.439	0.401	0.749	0.595	0.612	0.559
		Bankfull Width (m)	13.35					-
		Wetted Width (m)	12.80					-
		Bankfull-Wetted Depth (cm)	48					-
Mine-Exposed	RG_LI8							
	1	Depth (cm)	44	39	18	27	21	30
		Velocity (m/s)	0.879	0.702	0.715	0.882	1.140	0.864
		Bankfull Width (m)	13.20					-
		Wetted Width (m)	10.50					-
		Bankfull-Wetted Depth (cm)	38					-
	2	Depth (cm)	19	21	24	16	17	19
		Velocity (m/s)	0.635	1.305	0.362	0.451	0.847	0.720
		Bankfull Width (m)	12.45					-
		Wetted Width (m)	11.50					-
		Bankfull-Wetted Depth (cm)	-					-
	3	Depth (cm)	23	25	25	32	29	27
		Velocity (m/s)	0.545	0.788	0.901	0.611	0.638	0.697
		Bankfull Width (m)	15.10					-
		Wetted Width (m)	12.70					-
		Bankfull-Wetted Depth (cm)	-					-
Mine-Exposed	RG_FRUL							
	1	Depth (cm)	16	18	16	26	36	22
		Velocity (m/s)	0.668	0.742	0.775	0.803	0.613	0.720
		Bankfull Width (m)	21.8					-
		Wetted Width (m)	19.3					-
		Bankfull-Wetted Depth (cm)	-					-
	2	Depth (cm)	12	16	25	26	38	23
		Velocity (m/s)	0.366	0.548	0.663	0.764	0.824	0.633
		Bankfull Width (m)	19.4					-
		Wetted Width (m)	13.7					-
		Bankfull-Wetted Depth (cm)	35					-
	3	Depth (cm)	17	26	44	48	39	35
		Velocity (m/s)	0.511	1.038	0.738	0.583	0.626	0.699
		Bankfull Width (m)	17.1					-
		Wetted Width (m)	14.3					-
		Bankfull-Wetted Depth (cm)	-					-

Notes: "-" = Not sampled.

Table G.5: Depth and Velocity Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling at Line Creek and Fording River, September 2022

	Replicate		1	2	3	4	5	Mean
Mine-Exposed	RG_FO23							
	1	Depth (cm)	18	18	23	24	30	23
		Velocity (m/s)	0.131	0.244	0.418	0.380	0.485	0.332
		Bankfull Width (m)	26.6					-
		Wetted Width (m)	24.8					-
		Bankfull-Wetted Depth (cm)	24					-
	2	Depth (cm)	27	33	28	25	33	29
		Velocity (m/s)	0.475	0.429	0.516	0.706	0.680	0.561
		Bankfull Width (m)	28.2					-
		Wetted Width (m)	27.2					-
		Bankfull-Wetted Depth (cm)	-					-
	3	Depth (cm)	32	25	27	29	27	28
		Velocity (m/s)	0.636	0.693	0.553	0.844	0.725	0.690
		Bankfull Width (m)	28.2					-
		Wetted Width (m)	24.4					-
		Bankfull-Wetted Depth (cm)	-					-
	4	Depth (cm)	17	21	29	45	53	33
		Velocity (m/s)	0.223	0.293	0.763	0.658	0.864	0.560
		Bankfull Width (m)	18.9					-
		Wetted Width (m)	17.8					-
		Bankfull-Wetted Depth (cm)	-					-
	5	Depth (cm)	16	25	14	19	16	18
		Velocity (m/s)	0.354	0.628	0.444	0.386	0.451	0.453
		Bankfull Width (m)	26.5					-
		Wetted Width (m)	24.3					-
		Bankfull-Wetted Depth (cm)	-					-

Notes: "-" = Not sampled.

Table G.6: Habitat Information Associated with Mine-exposed and Reference Areas Sampled during the Benthic Invertebrate Survey for LCO LAEMP, September 2022

Station ID		Reference		Mine-Exposed							
		RG_LI24	RG_SLINE	RG_LCUT	RG_LILC3	RG_LISP24	RG_LIDSL	RG_LIDCOM	RG_LI8	RG_FRUL	RG_FO23
Waterbody		Line Creek	South Line Creek	Line Creek	Line Creek	Line Creek	Line Creek	Line Creek	Line Creek	Fording River	Fording River
Date Sampled		17-Sep-22	16-Sep-22	15-Sep-22	12-Sep-22	15-Sep-22	13-Sep-22	14-Sep-22	17-Sep-22	10-Sep-22	10-Sep-22
Weather		Cool, Overcast	-	Warm, Overcast	Smoky, Cool	Clear, Cool	Overcast, Smoky, Cool	Overcast, Cool	Clear, Cool	Clear, Cool	Cold, Partly Cloudy
Air Temperature (°C)		10	-	15	10	-	10	10	-	5	-
Habitat Characteristics											
Surrounding Land Use		-	-	Mining	Mining	Mining	Mining	Mining	Mining	Logging, Mining	Mining
Length of Reach Assessed (m)		30	50	30	50	100	100	50	100	100	-
Substrate	% Bedrock	0	0	0	0	0	0	0	0	0	0
	% Boulder	25	20	5	20	20	10	25	15	20	40
	% Cobble	40	50	30	60	40	70	55	55	50	30
	% Gravel	25	20	60	15	25	15	10	20	20	20
	% Sand	10	5	5	5	10	5	5	5	5	10
	% Fines	0	5	0	0	5	0	5	5	5	0
Water Clarity		Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
Water Colour		Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless
Vegetation											
Canopy Coverage (%)		51-75	26-50	1-25	0	1-25	1-25	1-25	26-50	1-25	1-25
Streamside Vegetation		Coniferous trees, Ferns/Grasses, Shrubs	Coniferous trees, Ferns/Grasses	Coniferous trees, Ferns/Grasses, Shrubs	Coniferous trees, Ferns/Grasses	Coniferous trees, Ferns/Grasses, Shrubs	Coniferous trees, Ferns/Grasses	Coniferous trees, Ferns/Grasses	Coniferous trees, Deciduous trees, Shrubs	Coniferous trees, Shrubs	Coniferous trees, Ferns/Grasses
Dominant Vegetation		Coniferous trees	Coniferous trees	Shrubs	Ferns/Grass	Ferns/Grass	Coniferous trees	Ferns/Grass	Coniferous trees	Coniferous trees	Ferns/Grass
Macrophyte Coverage (%)		0	0	0	1-25	0	0	0	0	0	0
Dominant Macrophyte		-	-	-	Bryophytes	-	-	-	-	-	-
Periphyton Cover (1-5)		2, 2, 2, 2, 2	2, 2, 2, 2, 2	3, 3, 3, 2, 3	3, 3, 3, 3, 4	2, 2, 3, 3, 3	2, 2, 3, 2, 2	3, 3, 3, 3, 3	3, 2, 2, 2, 2	1, 1, 2, 1, 1	2, 2, 2, 2, 2
Comments		-	-	-	-	-	-	-	-	-	-

Note: "-" indicates no data available.

APPENDIX H
LABORATORY REPORTS

WATER CHEMISTRY

ALS Laboratory Report CG2205126

(Finalized May 11, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2205126**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 03-May-2022 11:10
PO	: VPO00816101	Date Analysis Commenced	: 03-May-2022
C-O-C number	: REP_LAEMP_LCO_2022_APR_ALS	Issue Date	: 11-May-2022 08:51
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Dwayne Bennett	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Zakieh Lalonde		Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	RG_LCUT_WS_LAEMP_LCO_2022-04_NP	RG_LILC3_WS_LAEMP_LCO_2022-04_NP	RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	----
					Client sampling date / time	02-May-2022 10:20	02-May-2022 13:00	02-May-2022 14:30	02-May-2022 08:00	----
						CG2205126-001	CG2205126-002	CG2205126-003	CG2205126-004	--------
						Result	Result	Result	Result	----
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	5.6	3.1	<2.0	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		182	210	218	<1.0	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		222	256	266	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		8.8	3.8	7.6	<1.0	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		5.3	2.3	4.6	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		191	214	226	<1.0	----
conductivity	----	E100	2.0	µS/cm		827	1050	1120	<2.0	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		439	564	594	<0.50	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV		448	452	445	505	----
pH	----	E108	0.10	pH units		8.40	8.31	8.35	5.74	----
solids, total dissolved [TDS]	----	E162	10	mg/L		579	824	899	<10	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		7.9	1.8	2.0	<1.0	----
turbidity	----	E121	0.10	NTU		2.32	0.70	0.50	<0.10	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.250 DLDS	<0.250 DLDS	<0.050	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		3.22	10.0	16.8	<0.10	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.145	0.180	0.179	<0.020	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.801	1.09	0.984	<0.050	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		13.4	16.0	14.6	<0.0050	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0041	<0.0050 DLDS	<0.0050 DLDS	<0.0010	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	0.0026	0.0010	<0.0010	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0107	0.0033	0.0044	<0.0020	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		230	352	384	<0.30	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		1.26	<0.50	0.50	<0.50	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		2.10	<0.50	0.50	<0.50	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	RG_LCUT_WS_LAEMP_LCO_2022-04_NP	RG_LILC3_WS_LAEMP_LCO_2022-04_NP	RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	----
					Client sampling date / time	02-May-2022 10:20	02-May-2022 13:00	02-May-2022 14:30	02-May-2022 08:00	----
						CG2205126-001	CG2205126-002	CG2205126-003	CG2205126-004	--------
						Result	Result	Result	Result	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		9.66	13.0	14.0	<0.10	----
cation sum	----	EC101	0.10	meq/L		8.93	11.7	12.4	<0.10	----
ion balance (cations/anions)	----	EC101	0.010	%		92.4	90.0	88.6	100	----
ion balance (APHA)	----	EC101	0.010	%		3.93	5.26	6.06	<0.010	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0537	0.0053	0.0187	<0.0030	----
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00015	0.00038	0.00033	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00018	0.00020	0.00019	<0.00010	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.111	0.0498	0.0534	0.00014 RRV	----
beryllium, total	7440-41-7	E420	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.010	0.019	0.018	<0.010	----
cadmium, total	7440-43-9	E420	0.0050	µg/L		0.0260	0.359	0.229	<0.0050	----
calcium, total	7440-70-2	E420	0.050	mg/L		116	141	142	<0.050	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00021	0.00017	0.00018	<0.00010	----
cobalt, total	7440-48-4	E420	0.10	µg/L		<0.10	<0.10	0.11	<0.10	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
iron, total	7439-89-6	E420	0.010	mg/L		0.092	<0.010	0.045	<0.010	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000063	<0.000050	<0.000050	<0.000050	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0303	0.0762	0.0691	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		52.7	66.5	71.1	<0.0050	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00640	0.00021	0.0164	<0.00010	----
mercury, total	7439-97-6	E508-L	0.00050	µg/L		0.00082	<0.00050	<0.00050	<0.00050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00156	0.00219	0.00316	0.000089 RRV	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00190	0.0108	0.00840	<0.00050	----
potassium, total	7440-09-7	E420	0.050	mg/L		1.49	1.96	1.95	<0.050	----
selenium, total	7782-49-2	E420	0.050	µg/L		52.8	71.9	64.8	<0.050	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.23	2.31	2.20	<0.10	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		3.17	11.0	11.4	<0.050	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	RG_LCUT_WS_LAEMP_LCO_2022-04_NP	RG_LILC3_WS_LAEMP_LCO_2022-04_NP	RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	----
					Client sampling date / time	02-May-2022 10:20	02-May-2022 13:00	02-May-2022 14:30	02-May-2022 08:00	----
						CG2205126-001	CG2205126-002	CG2205126-003	CG2205126-004	--------
						Result	Result	Result	Result	----
Total Metals										
strontium, total	7440-24-6	E420	0.00020	mg/L		0.160	0.254	0.249	<0.00020	----
sulfur, total	7704-34-9	E420	0.50	mg/L		83.9	122	133	<0.50	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	0.000014	<0.000010	<0.000010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00090 DLM	<0.00030	<0.00030	<0.00030	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00275	0.00516	0.00515	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00070	0.00050	<0.00050	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	0.0128	0.0096	<0.0030	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0014	<0.0010	<0.0010	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00013	0.00036	0.00033	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00010	0.00013	0.00011	<0.00010	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0919	0.0471	0.0512	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	0.016	0.016	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.0231	0.321	0.215	<0.0050	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		99.5	128	133	<0.050	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		0.00014	0.00016	0.00017	<0.00010	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00023	0.00036	0.00031	<0.00020	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0256	0.0707	0.0659	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		46.2	59.4	63.5	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00106	<0.00010	0.0106	<0.00010	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00157	0.00213	0.00304	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00156	0.0102	0.00788	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.47	2.00	2.03	<0.050	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	RG_LCUT_WS_LAEMP_LCO_2022-04_NP	RG_LILC3_WS_LAEMP_LCO_2022-04_NP	RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	----
					Client sampling date / time	02-May-2022 10:20	02-May-2022 13:00	02-May-2022 14:30	02-May-2022 08:00	----
						CG2205126-001	CG2205126-002	CG2205126-003	CG2205126-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
selenium, dissolved	7782-49-2	E421	0.050	µg/L		53.6	75.2	68.0	<0.050	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.01	2.22	2.15	<0.050	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		2.88	9.77	10.5	<0.050	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.142	0.230	0.231	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		78.6	116	128	<0.50	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	0.000015	0.000011	<0.000010	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00252	0.00481	0.00486	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0010	0.0127	0.0081	<0.0010	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2205126**	Page	: 1 of 21
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 03-May-2022 11:10
PO	: VPO00816101	Issue Date	: 11-May-2022 08:51
C-O-C number	: REP_LAEMP_LCO_2022_APR_ALS		
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E298	02-May-2022	04-May-2022	----	----		04-May-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E298	02-May-2022	04-May-2022	----	----		04-May-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E298	02-May-2022	04-May-2022	----	----		04-May-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E298	02-May-2022	04-May-2022	----	----		04-May-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E378-U	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E378-U	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E378-U	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E378-U	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E235.F	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E235.F	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E235.F	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E235.F	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E235.SO4	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E235.SO4	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E235.SO4	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E235.SO4	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E318	02-May-2022	05-May-2022	----	----		05-May-2022	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E318	02-May-2022	05-May-2022	----	----		05-May-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E318	02-May-2022	05-May-2022	----	----		05-May-2022	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E318	02-May-2022	05-May-2022	----	----		05-May-2022	28 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E372-U	02-May-2022	05-May-2022	----	----		05-May-2022	28 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E372-U	02-May-2022	05-May-2022	----	----		05-May-2022	28 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E372-U	02-May-2022	05-May-2022	----	----		05-May-2022	28 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E372-U	02-May-2022	05-May-2022	----	----		05-May-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	02-May-2022	09-May-2022	----	----		09-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	02-May-2022	09-May-2022	----	----		09-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	02-May-2022	09-May-2022	----	----		09-May-2022	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	02-May-2022	09-May-2022	----	----		09-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E509	02-May-2022	07-May-2022	----	----		07-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E509	02-May-2022	07-May-2022	----	----		07-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E509	02-May-2022	07-May-2022	----	----		07-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E509	02-May-2022	07-May-2022	----	----		07-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E421	02-May-2022	09-May-2022	----	----		09-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E421	02-May-2022	09-May-2022	----	----		09-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E421	02-May-2022	09-May-2022	----	----		09-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E421	02-May-2022	09-May-2022	----	----		09-May-2022	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E358-L	02-May-2022	04-May-2022	----	----		05-May-2022	28 days	3 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E358-L	02-May-2022	04-May-2022	----	----		05-May-2022	28 days	3 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E358-L	02-May-2022	04-May-2022	----	----		05-May-2022	28 days	3 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E358-L	02-May-2022	04-May-2022	----	----		05-May-2022	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E355-L	02-May-2022	04-May-2022	----	----		05-May-2022	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E355-L	02-May-2022	04-May-2022	----	----		05-May-2022	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E355-L	02-May-2022	04-May-2022	----	----		05-May-2022	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E355-L	02-May-2022	04-May-2022	----	----		05-May-2022	28 days	3 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E283	02-May-2022	----	----	----		04-May-2022	14 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Acidity by Titration										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E283	02-May-2022	----	----	----		04-May-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E283	02-May-2022	----	----	----		04-May-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E283	02-May-2022	----	----	----		04-May-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E290	02-May-2022	----	----	----		03-May-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E290	02-May-2022	----	----	----		03-May-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E290	02-May-2022	----	----	----		03-May-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E290	02-May-2022	----	----	----		03-May-2022	14 days	1 days	✓
Physical Tests : Conductivity in Water										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E100	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Physical Tests : Conductivity in Water										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E100	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E100	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E100	02-May-2022	----	----	----		03-May-2022	28 days	1 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E125	02-May-2022	----	----	----		09-May-2022	0.25 hrs	167 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E125	02-May-2022	----	----	----		09-May-2022	0.25 hrs	168 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E125	02-May-2022	----	----	----		09-May-2022	0.25 hrs	171 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E125	02-May-2022	----	----	----		09-May-2022	0.25 hrs	173 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E108	02-May-2022	----	----	----		03-May-2022	0.25 hrs	26 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E108	02-May-2022	----	----	----		03-May-2022	0.25 hrs	28 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E108	02-May-2022	----	----	----		03-May-2022	0.25 hrs	31 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E108	02-May-2022	----	----	----		03-May-2022	0.25 hrs	33 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E162	02-May-2022	----	----	----		07-May-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E162	02-May-2022	----	----	----		07-May-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E162	02-May-2022	----	----	----		07-May-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E162	02-May-2022	----	----	----		07-May-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E160-L	02-May-2022	----	----	----		05-May-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E160-L	02-May-2022	----	----	----		05-May-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E160-L	02-May-2022	----	----	----		05-May-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E160-L	02-May-2022	----	----	----		05-May-2022	7 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E121	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E121	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E121	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E121	02-May-2022	----	----	----		03-May-2022	3 days	1 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	02-May-2022	----	----	----		08-May-2022	180 days	6 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	02-May-2022	----	----	----		08-May-2022	180 days	6 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	02-May-2022	----	----	----		08-May-2022	180 days	6 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	02-May-2022	----	----	----		08-May-2022	180 days	6 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E508-L	02-May-2022	----	----	----		07-May-2022	28 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved)										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E508-L	02-May-2022	----	----	----		07-May-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved)										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E508-L	02-May-2022	----	----	----		07-May-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved)										
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E508-L	02-May-2022	----	----	----		07-May-2022	28 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	E420	02-May-2022	----	----	----		08-May-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	E420	02-May-2022	----	----	----		08-May-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	E420	02-May-2022	----	----	----		08-May-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	E420	02-May-2022	----	----	----		08-May-2022	180 days	6 days	✓

Legend & Qualifier Definitions

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

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	476694	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	475939	1	11	9.0	5.0	✓
Ammonia by Fluorescence	E298	476756	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	475928	1	9	11.1	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	475929	1	9	11.1	5.0	✓
Conductivity in Water	E100	475940	1	7	14.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	481808	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	480071	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	481809	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	476697	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	476060	1	9	11.1	5.0	✓
Fluoride in Water by IC	E235.F	475932	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	475930	1	9	11.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	475931	1	9	11.1	5.0	✓
ORP by Electrode	E125	480110	1	20	5.0	5.0	✓
pH by Meter	E108	475941	1	4	25.0	5.0	✓
Sulfate in Water by IC	E235.SO4	475927	1	9	11.1	5.0	✓
TDS by Gravimetry	E162	477329	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	480183	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	476736	1	20	5.0	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	480228	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	480182	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	476698	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	476754	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	475914	1	9	11.1	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	476694	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	475939	1	11	9.0	5.0	✓
Ammonia by Fluorescence	E298	476756	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	475928	1	9	11.1	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	475929	1	9	11.1	5.0	✓
Conductivity in Water	E100	475940	1	7	14.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	481808	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	480071	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	481809	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	476697	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	476060	1	9	11.1	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	475932	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	475930	1	9	11.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	475931	1	9	11.1	5.0	✓
ORP by Electrode	E125	480110	1	20	5.0	5.0	✓
pH by Meter	E108	475941	1	4	25.0	5.0	✓
Sulfate in Water by IC	E235.SO4	475927	1	9	11.1	5.0	✓
TDS by Gravimetry	E162	477329	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	480183	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	476736	1	20	5.0	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	480228	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	480182	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	476698	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	476754	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	477324	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	475914	1	9	11.1	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	476694	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	475939	1	11	9.0	5.0	✓
Ammonia by Fluorescence	E298	476756	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	475928	1	9	11.1	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	475929	1	9	11.1	5.0	✓
Conductivity in Water	E100	475940	1	7	14.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	481808	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	480071	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	481809	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	476697	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	476060	1	9	11.1	5.0	✓
Fluoride in Water by IC	E235.F	475932	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	475930	1	9	11.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	475931	1	9	11.1	5.0	✓
Sulfate in Water by IC	E235.SO4	475927	1	9	11.1	5.0	✓
TDS by Gravimetry	E162	477329	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	480183	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	476736	1	20	5.0	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	480228	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	480182	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	476698	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	476754	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	477324	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	475914	1	9	11.1	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	476756	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	475928	1	9	11.1	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	475929	1	9	11.1	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	481808	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	480071	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	481809	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	476697	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	476060	1	9	11.1	5.0	✓
Fluoride in Water by IC	E235.F	475932	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	475930	1	9	11.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	475931	1	9	11.1	5.0	✓
Sulfate in Water by IC	E235.SO4	475927	1	9	11.1	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	480183	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	476736	1	20	5.0	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	480228	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	480182	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	476698	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	476754	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAFS.
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			

QUALITY CONTROL REPORT

Work Order	: **CG2205126**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 03-May-2022 11:10
PO	: VPO00816101	Date Analysis Commenced	: 03-May-2022
C-O-C number	: REP_LAEMP_LCO_2022_APR_ALS	Issue Date	: 11-May-2022 08:51
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Dwayne Bennett	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
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Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Zakieh Lalonde		Inorganics, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 475914)											
CG2205119-001	Anonymous	turbidity	----	E121	0.10	NTU	3.44	3.53	2.35%	15%	----
Physical Tests (QC Lot: 475939)											
CG2205106-007	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	239	253	5.60%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	239	253	5.60%	20%	----
Physical Tests (QC Lot: 475940)											
CG2205106-011	Anonymous	conductivity	----	E100	2.0	µS/cm	1860	1880	0.856%	10%	----
Physical Tests (QC Lot: 475941)											
CG2205126-001	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	pH	----	E108	0.10	pH units	8.40	8.45	0.593%	4%	----
Physical Tests (QC Lot: 476694)											
CG2205126-001	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 477329)											
CG2205104-005	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	306	282	8.16%	20%	----
Physical Tests (QC Lot: 480110)											
CG2205104-001	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	488	482	1.40%	15%	----
Anions and Nutrients (QC Lot: 475927)											
CG2205119-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	8.23	8.35	1.43%	20%	----
Anions and Nutrients (QC Lot: 475928)											
CG2205119-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 475929)											
CG2205119-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	0.41	0.40	0.01	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 475930)											
CG2205119-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0094	0.0086	0.0008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 475931)											
CG2205119-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 475932)											
CG2205119-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.104	0.105	0.0007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 476060)											
CG2205119-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0201	0.0197	1.89%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 476736)											
CG2205098-008	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.200	0.232	0.033	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 476754)											
CG2205106-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0042	0.0042	0.00004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 476756)											
CG2205106-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 476697)											
CG2205126-001	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.26	1.39	0.13	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 476698)											
CG2205126-001	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	2.10	1.82	0.28	Diff <2x LOR	----
Total Metals (QC Lot: 480182)											
CG2205098-008	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0038	0.0031	0.0007	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00021	0.00021	0.0000004	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00071	0.00068	0.00003	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0108	0.0108	0.0294%	20%	----
		beryllium, total	7440-41-7	E420	0.020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.042	0.041	0.002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0050	mg/L	0.677 µg/L	0.000650	4.01%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	288	282	2.08%	20%	----
		cobalt, total	7440-48-4	E420	0.10	mg/L	16.4 µg/L	0.0163	0.760%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.441	0.438	0.684%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000092	0.000091	0.000001	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0900	0.0846	6.18%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	180	175	2.93%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.537	0.528	1.70%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0132	0.0132	0.344%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.0625	0.0616	1.49%	20%	----
		potassium, total	7440-09-7	E420	0.050	mg/L	5.02	4.98	0.903%	20%	----
		selenium, total	7782-49-2	E420	0.050	mg/L	2.47 µg/L	0.00263	6.22%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.94	2.89	1.75%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	8.84	8.48	4.16%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.400	0.406	1.62%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 480182) - continued											
CG2205098-008	Anonymous	sulfur, total	7704-34-9	E420	0.50	mg/L	326	324	0.587%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000095	0.000096	0.0000008	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.0145	0.0146	0.162%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0227	0.0231	0.0004	Diff <2x LOR	----
Total Metals (QC Lot: 480183)											
CG2205098-008	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Total Metals (QC Lot: 480228)											
CG2205104-001	Anonymous	mercury, total	7439-97-6	E508-L	0.00050	ng/L	<0.00050 µg/L	<0.50	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 480071)											
CG2205070-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 481808)											
CG2205126-001	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00014	0.00017	0.00003	Diff <2x LOR	----
Dissolved Metals (QC Lot: 481809)											
CG2205126-001	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0014	<0.0010	0.0004	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00013	0.00013	0.000003	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00010	<0.00010	0.000003	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0919	0.0944	2.65%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0050	mg/L	0.0231 µg/L	0.0000190	0.0000041	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	99.5	99.8	0.261%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.10	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00023	0.00023	0.000002	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0256	0.0257	0.283%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	46.2	45.4	1.76%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00106	0.00106	0.133%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00157	0.00158	0.498%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00156	0.00155	0.000003	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 481809) - continued											
CG2205126-001	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.47	1.46	0.738%	20%	----
		selenium, dissolved	7782-49-2	E421	0.050	mg/L	53.6 µg/L	0.0541	0.822%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.01	2.01	0.163%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	2.88	2.87	0.383%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.142	0.145	1.41%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	78.6	78.3	0.403%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00252	0.00252	0.0985%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----

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: 475914)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 475939)						
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: 475940)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 476694)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 477324)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 477329)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 475927)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 475928)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 475929)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 475930)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 475931)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 475932)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 476060)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 476736)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 476754)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 476756)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 476756) - continued						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 476697)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 476698)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 480182)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 480182) - continued						
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 480183)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 480228)						
mercury, total	7439-97-6	E508-L	0.5	ng/L	<0.50	----
Dissolved Metals (QCLot: 480071)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 481808)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 481809)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 481809) - continued						
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
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	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 475914)									
turbidity	----	E121	0.1	NTU	200 NTU	105	85.0	115	----
Physical Tests (QCLot: 475939)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	102	85.0	115	----
Physical Tests (QCLot: 475940)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	102	90.0	110	----
Physical Tests (QCLot: 475941)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 476694)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	104	85.0	115	----
Physical Tests (QCLot: 477324)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	90.4	85.0	115	----
Physical Tests (QCLot: 477329)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	98.3	85.0	115	----
Physical Tests (QCLot: 480110)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	98.6	95.4	104	----
Anions and Nutrients (QCLot: 475927)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 475928)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	98.1	85.0	115	----
Anions and Nutrients (QCLot: 475929)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 475930)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 475931)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 475932)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 476060)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	99.1	80.0	120	----
Anions and Nutrients (QCLot: 476736)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 476754)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 476754) - continued									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	111	80.0	120	----
Anions and Nutrients (QCLot: 476756)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	94.7	85.0	115	----
Organic / Inorganic Carbon (QCLot: 476697)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	100	80.0	120	----
Organic / Inorganic Carbon (QCLot: 476698)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	108	80.0	120	----
Total Metals (QCLot: 480182)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	100	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	99.3	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.1	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	96.2	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.5	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.5	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	96.7	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	99.7	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.6	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	105	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.9	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	100	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	99.7	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	93.6	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	109	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	97.8	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	86.8	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	95.3	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 480182) - continued									
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	98.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	109	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	96.3	80.0	120	----
Total Metals (QCLot: 480183)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	98.9	80.0	120	----
Total Metals (QCLot: 480228)									
mercury, total	7439-97-6	E508-L	0.5	ng/L	5 ng/L	99.6	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	98.4	80.0	120	----
Dissolved Metals (QCLot: 481808)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 481809)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	100	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	98.8	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	103	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	93.5	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.8	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	106	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	98.3	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	106	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	112	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	96.4	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	108	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 481809) - continued									
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	98.9	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	103	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	100	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: 475927)										
CG2205126-004	RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	sulfate (as SO4)	14808-79-8	E235.SO4	101 mg/L	100 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 475928)										
CG2205126-004	RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	bromide	24959-67-9	E235.Br-L	0.488 mg/L	0.5 mg/L	97.6	75.0	125	----
Anions and Nutrients (QCLot: 475929)										
CG2205126-004	RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	chloride	16887-00-6	E235.Cl-L	101 mg/L	100 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 475930)										
CG2205126-004	RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	nitrate (as N)	14797-55-8	E235.NO3-L	2.52 mg/L	2.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 475931)										
CG2205126-004	RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	nitrite (as N)	14797-65-0	E235.NO2-L	0.513 mg/L	0.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 475932)										
CG2205126-004	RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	fluoride	16984-48-8	E235.F	0.997 mg/L	1 mg/L	99.7	75.0	125	----
Anions and Nutrients (QCLot: 476060)										
CG2205119-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0516 mg/L	0.05 mg/L	103	70.0	130	----
Anions and Nutrients (QCLot: 476736)										
CG2205098-010	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.01 mg/L	2.5 mg/L	80.4	70.0	130	----
Anions and Nutrients (QCLot: 476754)										
CG2205106-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0574 mg/L	0.0676 mg/L	85.0	70.0	130	----
Anions and Nutrients (QCLot: 476756)										
CG2205106-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.110 mg/L	0.1 mg/L	110	75.0	125	----
Organic / Inorganic Carbon (QCLot: 476697)										
CG2205126-001	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	carbon, dissolved organic [DOC]	----	E358-L	5.47 mg/L	5 mg/L	109	70.0	130	----
Organic / Inorganic Carbon (QCLot: 476698)										
CG2205126-001	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	carbon, total organic [TOC]	----	E355-L	4.57 mg/L	5 mg/L	91.5	70.0	130	----
Total Metals (QCLot: 480182)										

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: 480182) - continued										
CG2205098-010	Anonymous	aluminum, total	7429-90-5	E420	0.183 mg/L	0.2 mg/L	91.7	70.0	130	----
		antimony, total	7440-36-0	E420	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00861 mg/L	0.01 mg/L	86.1	70.0	130	----
		boron, total	7440-42-8	E420	0.093 mg/L	0.1 mg/L	93.0	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00357 mg/L	0.004 mg/L	89.3	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0178 mg/L	0.02 mg/L	88.8	70.0	130	----
		copper, total	7440-50-8	E420	0.0174 mg/L	0.02 mg/L	87.0	70.0	130	----
		iron, total	7439-89-6	E420	1.88 mg/L	2 mg/L	94.0	70.0	130	----
		lead, total	7439-92-1	E420	0.0174 mg/L	0.02 mg/L	87.0	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, total	7440-02-0	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		selenium, total	7782-49-2	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, total	7440-21-3	E420	9.44 mg/L	10 mg/L	94.4	70.0	130	----
		silver, total	7440-22-4	E420	0.00388 mg/L	0.004 mg/L	97.1	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00343 mg/L	0.004 mg/L	85.8	70.0	130	----
		tin, total	7440-31-5	E420	0.0186 mg/L	0.02 mg/L	93.0	70.0	130	----
		titanium, total	7440-32-6	E420	0.0395 mg/L	0.04 mg/L	98.7	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0969 mg/L	0.1 mg/L	96.9	70.0	130	----
		zinc, total	7440-66-6	E420	0.349 mg/L	0.4 mg/L	87.3	70.0	130	----
Total Metals (QCLot: 480183)										
CG2205098-010	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0375 mg/L	0.04 mg/L	93.8	70.0	130	----
Total Metals (QCLot: 480228)										
CG2205104-002	Anonymous	mercury, total	7439-97-6	E508-L	5.59 ng/L	5 ng/L	112	70.0	130	----
Dissolved Metals (QCLot: 480071)										

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: 480071) - continued										
CG2205119-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000939 mg/L	0.0001 mg/L	93.9	70.0	130	----
Dissolved Metals (QCLot: 481808)										
CG2205126-002	RG_LCUT_WS_LAEMP_LCO_2022-04_NP	chromium, dissolved	7440-47-3	E421.Cr-L	0.0392 mg/L	0.04 mg/L	98.0	70.0	130	----
Dissolved Metals (QCLot: 481809)										
CG2205126-002	RG_LCUT_WS_LAEMP_LCO_2022-04_NP	aluminum, dissolved	7429-90-5	E421	0.194 mg/L	0.2 mg/L	97.2	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0370 mg/L	0.04 mg/L	92.4	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00853 mg/L	0.01 mg/L	85.3	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.090 mg/L	0.1 mg/L	90.5	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00385 mg/L	0.004 mg/L	96.2	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0184 mg/L	0.02 mg/L	92.1	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0182 mg/L	0.02 mg/L	91.1	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	0.0182 mg/L	0.02 mg/L	91.3	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0874 mg/L	0.1 mg/L	87.4	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0186 mg/L	0.02 mg/L	93.1	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0357 mg/L	0.04 mg/L	89.3	70.0	130	----
		potassium, dissolved	7440-09-7	E421	4.07 mg/L	4 mg/L	102	70.0	130	----
		selenium, dissolved	7782-49-2	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.29 mg/L	10 mg/L	92.9	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00398 mg/L	0.004 mg/L	99.6	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00365 mg/L	0.004 mg/L	91.3	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0378 mg/L	0.04 mg/L	94.6	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0998 mg/L	0.1 mg/L	99.8	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.376 mg/L	0.4 mg/L	93.9	70.0	130	----

Teck

COC ID: REP_LAEMP_LCO_2022_APR_ALS | TURNAROUND TIME: Regular | RUSH: N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1:	aquascilab@teck.com	X	X	X
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City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Tyler.Mehler@Minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6:	lbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	403 407 1794			PO number	VPO00816101			

SAMPLE DETAILS | ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: N)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	HG-T-U-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-METNHG-T-CL	TECKCOAL-ROUTINE-VA
								FIL: F	N	F	N	F	N	N
								PRESERV. H2SO4	H2SO4	HCL	NONE	HNO3	HNO3	NONE
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	RG_FRUL	WS	NO	2022-05-02	10:20	G	7	X	X	X	X	X	X	X
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	RG_LCUT	WS	NO	2022-05-02	13:00	G	7	X	X	X	X	X	X	X
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	RG_LILC3	WS	NO	2022-05-02	14:30	G	7	X	X	X	X	X	X	X
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	RG_FBLANK	WS	NO	2022-05-02	08:00	G	7	X	X	X	X	X	X	X
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Please include DI for field blank	Rick Smit/Lotic Environmental	2022-05-02/17:00		5/3 11:10

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Rick Smit	Mobile #	403-586-3841
Priority (2-3 business days) - 50% surcharge		Sampler's Signature		Date/Time	2022 05 -02 / 17:00
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

7c

Environmental Division Calgary Work Order Reference CG2205126

Environmental Division Calgary Work Order Reference CG2205126

Telephone : +1 403 407 1800

WATER CHEMISTRY

ALS Laboratory Report CG2205191
(Finalized May 16, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2205191**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 04-May-2022 10:35
PO	: VPO00816101	Date Analysis Commenced	: 04-May-2022
C-O-C number	: REP_LAEMP_LCO_2022_APR_ALS	Issue Date	: 16-May-2022 12:19
Sampler	: Rick Smit		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kyle Chang	Lab Assistant	Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Parnian Sane	Analsyt	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Woochan Song	Lab Analyst	Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	RG_LI24_WS_LAEMP_LCO_2022-04_NP	RG_SLINE_WS_LAEMP_LCO_2022-04_NP	RG_RIVER_WS_LAEMP_LCO_2022-04_NP	----
					Client sampling date / time	03-May-2022 09:00	03-May-2022 11:15	03-May-2022 13:30	03-May-2022 15:30	----
						CG2205191-001	CG2205191-002	CG2205191-003	CG2205191-004	--------
						Result	Result	Result	Result	----
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	2.0	<2.0	<2.0	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		118	193	138	135	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		143	236	168	165	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		2.0	8.6	5.4	5.6	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		1.2	5.2	3.2	3.4	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		120	202	143	141	----
conductivity	----	E100	2.0	µS/cm		280	898	324	325	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		152	497	183	182	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV		368	364	358	348	----
pH	----	E108	0.10	pH units		8.37	8.44	8.46	8.47	----
solids, total dissolved [TDS]	----	E162	10	mg/L		153	618	201	194	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		6.3	1.2	3.2	8.9	----
turbidity	----	E121	0.10	NTU		0.78	0.97	2.96	5.40	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		0.18	11.8	0.26	0.24	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.321	0.201	0.293	0.296	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.084	<0.050 TKNI	0.087	0.068	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.195	9.97	0.0742	0.0658	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	0.0015	0.0011	<0.0010	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0026	0.0031	0.0095	0.0088	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		33.1	258	37.0	37.2	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		0.67	0.77	1.98	1.09	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		0.88	0.82	1.92	0.95	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	RG_LI24_WS_LAEMP_LCO_2022-04_NP	RG_SLINE_WS_LAEMP_LCO_2022-04_NP	RG_RIVER_WS_LAEMP_LCO_2022-04_NP	----
					Client sampling date / time	03-May-2022 09:00	03-May-2022 11:15	03-May-2022 13:30	03-May-2022 15:30	----
						CG2205191-001	CG2205191-002	CG2205191-003	CG2205191-004	--------
						Result	Result	Result	Result	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		3.12	10.5	3.66	3.62	----
cation sum	----	EC101	0.10	meq/L		3.11	10.3	3.70	3.68	----
ion balance (cations/anions)	----	EC101	0.010	%		99.7	98.1	101	102	----
ion balance (APHA)	----	EC101	0.010	%		0.160	0.962	0.543	0.822	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0034	0.0030	0.0443	0.0528	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	0.00025	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00017	0.00014	0.00016	0.00017	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0378	0.0490	0.0392	0.0408	----
beryllium, total	7440-41-7	E420	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	0.014	<0.010	<0.010	----
cadmium, total	7440-43-9	E420	0.0050	µg/L		0.0080	0.157	0.0210	0.0199	----
calcium, total	7440-70-2	E420	0.050	mg/L		43.9	114	49.1	48.5	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00017	0.00016	0.00022	0.00023	----
cobalt, total	7440-48-4	E420	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.010	0.035	0.045	0.052	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	0.000052	0.000057	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0032	0.0498	0.0039	0.0038	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		10.8	52.3	14.8	15.3	----
manganese, total	7439-96-5	E420	0.00010	mg/L		<0.00010	0.0107	0.00236	0.00258	----
mercury, total	7439-97-6	E508-L	0.00050	µg/L		<0.00050	<0.00050	0.00078	0.00086	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000761	0.00239	0.000954	0.000984	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00054	0.00609	<0.00050	<0.00050	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.283	1.50	0.402	0.413	----
selenium, total	7782-49-2	E420	0.050	µg/L		1.72	49.4	1.22	1.27	----
silicon, total	7440-21-3	E420	0.10	mg/L		1.70	2.21	2.18	2.27	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		1.30	7.92	0.817	0.819	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_LISP24_WS_LAEMP_LCO_2022-04_NP	RG_LI24_WS_LAEMP_LCO_2022-04_NP	RG_SLINE_WS_LAEMP_LCO_2022-04_NP	RG_RIVER_WS_LAEMP_LCO_2022-04_NP	----
Client sampling date / time					03-May-2022 09:00	03-May-2022 11:15	03-May-2022 13:30	03-May-2022 15:30	----
					CG2205191-001	CG2205191-002	CG2205191-003	CG2205191-004	--------
					Result	Result	Result	Result	----
Total Metals									
strontium, total	7440-24-6	E420	0.00020	mg/L	0.152	0.222	0.159	0.162	----
sulfur, total	7704-34-9	E420	0.50	mg/L	12.9	101	14.0	14.4	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030 DLM	0.00094	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00115	0.00394	0.00144	0.00147	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	0.0068	0.0034	0.0039	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0022	<0.0010	0.0021	0.0014	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	0.00024	<0.00010	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00015	<0.00010	0.00012	0.00011	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0367	0.0478	0.0386	0.0379	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	<0.020	<0.020	<0.020	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	0.015	<0.010	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.0070	0.135	0.0138	0.0137	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	43.9	118	49.1	49.0	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00015	0.00011	0.00016	0.00016	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	0.00021	0.00043	<0.00020	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0034	0.0522	0.0039	0.0038	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	10.4	49.2	14.6	14.5	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	0.00479	0.00013	0.00011	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000892	0.00239	0.00116	0.00104	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	0.00544	<0.00050	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.278	1.43	0.394	0.383	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	RG_LI24_WS_LAEMP_LCO_2022-04_NP	RG_SLINE_WS_LAEMP_LCO_2022-04_NP	RG_RIVER_WS_LAEMP_LCO_2022-04_NP	----
					Client sampling date / time	03-May-2022 09:00	03-May-2022 11:15	03-May-2022 13:30	03-May-2022 15:30	----
						CG2205191-001	CG2205191-002	CG2205191-003	CG2205191-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
selenium, dissolved	7782-49-2	E421	0.050	µg/L		1.53	47.2	1.19	1.16	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.61	2.10	2.02	2.09	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		1.23	7.59	0.793	0.780	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.146	0.215	0.156	0.157	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		12.7	98.3	13.5	13.7	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00113	0.00370	0.00136	0.00137	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0019	0.0055	0.0036	0.0020	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2205191**	Page	: 1 of 21
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 04-May-2022 10:35
PO	: VPO00816101	Issue Date	: 16-May-2022 12:19
C-O-C number	: REP_LAEMP_LCO_2022_APR_ALS		
Sampler	: Rick Smit		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E298	03-May-2022	06-May-2022	----	----		06-May-2022	28 days	3 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E298	03-May-2022	06-May-2022	----	----		06-May-2022	28 days	3 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E298	03-May-2022	06-May-2022	----	----		06-May-2022	28 days	3 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E298	03-May-2022	06-May-2022	----	----		06-May-2022	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LI24_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LI24_WS_LAEMP_LCO_2022-04_NP	E378-U	03-May-2022	----	----	----		04-May-2022	3 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E378-U	03-May-2022	----	----	----		04-May-2022	3 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E378-U	03-May-2022	----	----	----		04-May-2022	3 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E378-U	03-May-2022	----	----	----		04-May-2022	3 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LI24_WS_LAEMP_LCO_2022-04_NP	E235.F	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E235.F	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E235.F	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E235.F	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LI24_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	03-May-2022	----	----	----		05-May-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	03-May-2022	----	----	----		05-May-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	03-May-2022	----	----	----		05-May-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	03-May-2022	----	----	----		05-May-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LI24_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	03-May-2022	----	----	----		05-May-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	03-May-2022	----	----	----		05-May-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	03-May-2022	----	----	----		05-May-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	03-May-2022	----	----	----		05-May-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E235.SO4	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E235.SO4	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E235.SO4	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E235.SO4	03-May-2022	----	----	----		05-May-2022	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E318	03-May-2022	06-May-2022	----	----		08-May-2022	28 days	5 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E318	03-May-2022	06-May-2022	----	----		08-May-2022	28 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E318	03-May-2022	06-May-2022	----	----		08-May-2022	28 days	5 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E318	03-May-2022	06-May-2022	----	----		08-May-2022	28 days	5 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E372-U	03-May-2022	05-May-2022	----	----		11-May-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E372-U	03-May-2022	05-May-2022	----	----		11-May-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E372-U	03-May-2022	05-May-2022	----	----		11-May-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E372-U	03-May-2022	05-May-2022	----	----		11-May-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	03-May-2022	10-May-2022	----	----		10-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	03-May-2022	10-May-2022	----	----		10-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	03-May-2022	10-May-2022	----	----		10-May-2022	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	03-May-2022	10-May-2022	----	----		10-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LI24_WS_LAEMP_LCO_2022-04_NP	E509	03-May-2022	09-May-2022	----	----		09-May-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E509	03-May-2022	09-May-2022	----	----		09-May-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E509	03-May-2022	09-May-2022	----	----		09-May-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E509	03-May-2022	09-May-2022	----	----		09-May-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_LI24_WS_LAEMP_LCO_2022-04_NP	E421	03-May-2022	10-May-2022	----	----		10-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E421	03-May-2022	10-May-2022	----	----		10-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E421	03-May-2022	10-May-2022	----	----		10-May-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E421	03-May-2022	10-May-2022	----	----		10-May-2022	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E358-L	03-May-2022	06-May-2022	----	----		10-May-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E358-L	03-May-2022	06-May-2022	----	----		10-May-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E358-L	03-May-2022	06-May-2022	----	----		10-May-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E358-L	03-May-2022	06-May-2022	----	----		10-May-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E355-L	03-May-2022	06-May-2022	----	----		10-May-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E355-L	03-May-2022	06-May-2022	----	----		10-May-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E355-L	03-May-2022	06-May-2022	----	----		10-May-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E355-L	03-May-2022	06-May-2022	----	----		10-May-2022	28 days	7 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E283	03-May-2022	----	----	----		06-May-2022	14 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Acidity by Titration										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E283	03-May-2022	----	----	----		06-May-2022	14 days	3 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E283	03-May-2022	----	----	----		06-May-2022	14 days	3 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E283	03-May-2022	----	----	----		06-May-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E290	03-May-2022	----	----	----		06-May-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E290	03-May-2022	----	----	----		06-May-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E290	03-May-2022	----	----	----		06-May-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E290	03-May-2022	----	----	----		06-May-2022	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E100	03-May-2022	----	----	----		06-May-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E100	03-May-2022	----	----	----		06-May-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E100	03-May-2022	----	----	----		06-May-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E100	03-May-2022	----	----	----		06-May-2022	28 days	3 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E125	03-May-2022	----	----	----		10-May-2022	0.25 hrs	167 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E125	03-May-2022	----	----	----		10-May-2022	0.25 hrs	169 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LI24_WS_LAEMP_LCO_2022-04_NP	E125	03-May-2022	----	----	----		10-May-2022	0.25 hrs	172 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E125	03-May-2022	----	----	----		10-May-2022	0.25 hrs	174 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E108	03-May-2022	----	----	----		06-May-2022	0.25 hrs	69 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E108	03-May-2022	----	----	----		06-May-2022	0.25 hrs	71 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LI24_WS_LAEMP_LCO_2022-04_NP	E108	03-May-2022	----	----	----		06-May-2022	0.25 hrs	73 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E108	03-May-2022	----	----	----		06-May-2022	0.25 hrs	75 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_LI24_WS_LAEMP_LCO_2022-04_NP	E162	03-May-2022	----	----	----		10-May-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E162	03-May-2022	----	----	----		10-May-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E162	03-May-2022	----	----	----		10-May-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E162	03-May-2022	----	----	----		10-May-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LI24_WS_LAEMP_LCO_2022-04_NP	E160-L	03-May-2022	----	----	----		09-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E160-L	03-May-2022	----	----	----		09-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E160-L	03-May-2022	----	----	----		09-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E160-L	03-May-2022	----	----	----		09-May-2022	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LI24_WS_LAEMP_LCO_2022-04_NP	E121	03-May-2022	----	----	----		04-May-2022	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E121	03-May-2022	----	----	----		04-May-2022	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E121	03-May-2022	----	----	----		04-May-2022	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E121	03-May-2022	----	----	----		04-May-2022	3 days	1 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_LI24_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	03-May-2022	----	----	----		10-May-2022	180 days	7 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	03-May-2022	----	----	----		10-May-2022	180 days	7 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	03-May-2022	----	----	----		10-May-2022	180 days	7 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	03-May-2022	----	----	----		10-May-2022	180 days	7 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_LI24_WS_LAEMP_LCO_2022-04_NP	E508-L	03-May-2022	----	----	----		08-May-2022	28 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved)										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E508-L	03-May-2022	----	----	----		08-May-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved)										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E508-L	03-May-2022	----	----	----		08-May-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved)										
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E508-L	03-May-2022	----	----	----		08-May-2022	28 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
RG_LI24_WS_LAEMP_LCO_2022-04_NP	E420	03-May-2022	----	----	----		10-May-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	E420	03-May-2022	----	----	----		10-May-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	E420	03-May-2022	----	----	----		10-May-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	E420	03-May-2022	----	----	----		10-May-2022	180 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	479521	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	479526	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	479903	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	477675	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	477676	1	20	5.0	5.0	✓
Conductivity in Water	E100	479525	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	483086	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	481456	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	483085	1	13	7.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	479726	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	477205	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	477679	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	477677	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	477678	1	20	5.0	5.0	✓
ORP by Electrode	E125	481837	1	20	5.0	5.0	✓
pH by Meter	E108	479524	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	477674	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	480573	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	482522	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	479652	1	17	5.8	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	480804	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	482521	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	479727	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	478202	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	477050	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	479521	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	479526	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	479903	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	477675	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	477676	1	20	5.0	5.0	✓
Conductivity in Water	E100	479525	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	483086	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	481456	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	483085	1	13	7.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	479726	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	477205	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	477679	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	477677	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	477678	1	20	5.0	5.0	✓
ORP by Electrode	E125	481837	1	20	5.0	5.0	✓
pH by Meter	E108	479524	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	477674	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	480573	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	482522	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	479652	1	17	5.8	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	480804	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	482521	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	479727	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	478202	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	480561	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	477050	1	14	7.1	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	479521	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	479526	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	479903	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	477675	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	477676	1	20	5.0	5.0	✓
Conductivity in Water	E100	479525	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	483086	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	481456	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	483085	1	13	7.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	479726	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	477205	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	477679	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	477677	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	477678	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	477674	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	480573	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	482522	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	479652	1	17	5.8	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	480804	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	482521	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	479727	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	478202	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	480561	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	477050	1	14	7.1	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	479903	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	477675	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	477676	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	483086	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	481456	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	483085	1	13	7.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	479726	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	477205	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	477679	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	477677	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	477678	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	477674	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	482522	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	479652	1	17	5.8	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	480804	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	482521	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	479727	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	478202	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAFS.
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			

QUALITY CONTROL REPORT

Work Order	: **CG2205191**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 04-May-2022 10:35
PO	: VPO00816101	Date Analysis Commenced	: 04-May-2022
C-O-C number	: REP_LAEMP_LCO_2022_APR_ALS	Issue Date	: 16-May-2022 12:19
Sampler	: Rick Smit		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Caleb Deroche	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kyle Chang	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Calgary Inorganics, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Calgary Inorganics, Calgary, Alberta
Parnian Sane	Analsyt	Vancouver Metals, Burnaby, British Columbia
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Ruifang Zheng	Analyst	Calgary Inorganics, Calgary, Alberta
Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Woochan Song	Lab Analyst	Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 477050)											
CG2205188-001	Anonymous	turbidity	----	E121	0.10	NTU	1.54	1.45	6.28%	15%	----
Physical Tests (QC Lot: 479521)											
CG2205187-001	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 479524)											
CG2205187-001	Anonymous	pH	----	E108	0.10	pH units	8.46	8.47	0.118%	4%	----
Physical Tests (QC Lot: 479525)											
CG2205187-001	Anonymous	conductivity	----	E100	2.0	µS/cm	626	627	0.160%	10%	----
Physical Tests (QC Lot: 479526)											
CG2205187-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	191	199	4.20%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	8.8	9.2	0.4	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	200	208	4.22%	20%	----
Physical Tests (QC Lot: 480573)											
CG2205187-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	429	405	5.76%	20%	----
Physical Tests (QC Lot: 481837)											
CG2205168-001	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	347	334	3.82%	15%	----
Anions and Nutrients (QC Lot: 477205)											
CG2205177-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0500	mg/L	2.45	2.34	4.47%	20%	----
Anions and Nutrients (QC Lot: 477674)											
CG2205187-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	151	150	0.735%	20%	----
Anions and Nutrients (QC Lot: 477675)											
CG2205187-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 477676)											
CG2205187-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	0.88	0.81	0.07	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 477677)											
CG2205187-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.669	0.662	1.11%	20%	----
Anions and Nutrients (QC Lot: 477678)											
CG2205187-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 477679)											
CG2205187-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.187	0.186	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 478202)											

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: 478202) - continued											
CG2205191-001	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0026	0.0032	0.0006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 479652)											
CG2205191-001	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.084	0.071	0.013	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 479903)											
CG2205187-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0050	<0.0050	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 479726)											
CG2205191-001	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.67	0.88	0.20	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 479727)											
CG2205191-001	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.88	0.86	0.03	Diff <2x LOR	----
Total Metals (QC Lot: 480804)											
CG2205168-001	Anonymous	mercury, total	7439-97-6	E508-L	0.50	ng/L	<0.00050 µg/L	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 482521)											
CG2205187-002	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0790	0.0776	1.85%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00011	0.00011	0.000002	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00019	0.00022	0.00002	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0467	0.0461	1.28%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0368 µg/L	0.0000311	0.0000056	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	79.7	78.6	1.34%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.095	0.099	0.004	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000090	0.000094	0.000003	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0076	0.0076	0.00005	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	41.2	41.3	0.366%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00409	0.00400	2.12%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000811	0.000859	5.70%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00125	0.00114	0.00011	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.03	1.02	0.487%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	41.0 µg/L	0.0407	0.809%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.08	2.06	0.919%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 482521) - continued											
CG2205187-002	Anonymous	silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	1.66	1.65	0.346%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.112	0.113	0.607%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	60.7	61.3	0.912%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000010	0.000012	0.000001	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	0.00012	0.00012	0.000007	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00120	mg/L	<0.00120	<0.00120	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00241	0.00237	1.71%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	0.00051	0.00001	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	0.0040	0.0010	Diff <2x LOR	----
Total Metals (QC Lot: 482522)											
CG2205187-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00025	0.00023	0.00002	Diff <2x LOR	----
Dissolved Metals (QC Lot: 481456)											
CG2205187-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 483085)											
CG2205191-001	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0022	0.0019	0.0003	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00015	0.00016	0.00001	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0367	0.0377	2.61%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0070 µg/L	0.0000059	0.0000011	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	43.9	43.6	0.758%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0034	0.0033	0.00001	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	10.4	10.7	2.80%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000892	0.000859	3.80%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	0.00051	0.00001	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.278	0.299	0.021	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	1.53 µg/L	0.00152	0.228%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 483085) - continued											
CG2205191-001	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.61	1.63	1.49%	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	1.23	1.24	0.874%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.146	0.147	0.414%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	12.7	12.1	4.85%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00113	0.00115	1.61%	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	0.0019	0.0017	0.0002	Diff <2x LOR	----
Dissolved Metals (QC Lot: 483086)											
CG2205191-001	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00015	0.00018	0.00003	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: 477050)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 479521)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 479525)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 479526)						
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: 480561)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 480573)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 477205)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 477674)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 477675)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 477676)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 477677)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 477678)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 477679)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 478202)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 479652)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 479903)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 479903) - continued						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 479726)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 479727)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 480804)						
mercury, total	7439-97-6	E508-L	0.5	ng/L	<0.50	----
Total Metals (QCLot: 482521)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 482521) - continued						
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	----
Total Metals (QCLot: 482522)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 481456)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 483085)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 483085) - continued						
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	----
Dissolved Metals (QCLot: 483086)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 477050)									
turbidity	----	E121	0.1	NTU	200 NTU	98.6	85.0	115	----
Physical Tests (QCLot: 479521)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	104	85.0	115	----
Physical Tests (QCLot: 479524)									
pH	----	E108	----	pH units	7 pH units	101	98.6	101	----
Physical Tests (QCLot: 479525)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	102	90.0	110	----
Physical Tests (QCLot: 479526)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 480561)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	91.8	85.0	115	----
Physical Tests (QCLot: 480573)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	91.7	85.0	115	----
Physical Tests (QCLot: 481837)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	98.1	95.4	104	----
Anions and Nutrients (QCLot: 477205)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	109	80.0	120	----
Anions and Nutrients (QCLot: 477674)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 477675)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	97.9	85.0	115	----
Anions and Nutrients (QCLot: 477676)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 477677)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 477678)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 477679)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 478202)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	101	80.0	120	----
Anions and Nutrients (QCLot: 479652)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 479652) - continued									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	93.8	75.0	125	----
Anions and Nutrients (QCLot: 479903)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	106	85.0	115	----
Organic / Inorganic Carbon (QCLot: 479726)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	96.2	80.0	120	----
Organic / Inorganic Carbon (QCLot: 479727)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	103	80.0	120	----
Total Metals (QCLot: 480804)									
mercury, total	7439-97-6	E508-L	0.5	ng/L	5 ng/L	92.2	80.0	120	----
Total Metals (QCLot: 482521)									
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	106	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	106	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	108	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	105	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	107	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	104	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	110	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	106	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	108	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	108	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	111	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	93.9	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	105	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 482521) - continued									
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	105	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.6	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	106	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	105	80.0	120	----
Total Metals (QCLot: 482522)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 483085)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	98.8	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.1	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	96.7	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	97.9	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	97.6	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	101	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	94.5	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.2	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.5	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	98.6	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	95.2	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	94.5	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	95.7	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	97.9	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	96.3	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	99.4	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	99.5	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	88.6	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	99.3	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	90.1	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 483085) - continued									
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	95.2	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	99.0	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.4	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.9	80.0	120	----
Dissolved Metals (QCLot: 483086)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	97.7	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: 477205)										
CG2205188-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0506 mg/L	0.05 mg/L	101	70.0	130	----
Anions and Nutrients (QCLot: 477674)										
CG2205202-016	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	99.4 mg/L	100 mg/L	99.4	75.0	125	----
Anions and Nutrients (QCLot: 477675)										
CG2205202-016	Anonymous	bromide	24959-67-9	E235.Br-L	0.460 mg/L	0.5 mg/L	92.1	75.0	125	----
Anions and Nutrients (QCLot: 477676)										
CG2205202-016	Anonymous	chloride	16887-00-6	E235.Cl-L	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 477677)										
CG2205202-016	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.60 mg/L	2.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 477678)										
CG2205202-016	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.545 mg/L	0.5 mg/L	109	75.0	125	----
Anions and Nutrients (QCLot: 477679)										
CG2205202-016	Anonymous	fluoride	16984-48-8	E235.F	1.08 mg/L	1 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 478202)										
CG2205191-002	RG_LI24_WS_LAEMP_LCO_2022-04_NP	phosphorus, total	7723-14-0	E372-U	0.0550 mg/L	0.0676 mg/L	81.3	70.0	130	----
Anions and Nutrients (QCLot: 479652)										
CG2205191-002	RG_LI24_WS_LAEMP_LCO_2022-04_NP	Kjeldahl nitrogen, total [TKN]	----	E318	2.39 mg/L	2.5 mg/L	95.5	70.0	130	----
Anions and Nutrients (QCLot: 479903)										
CG2205187-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.110 mg/L	0.1 mg/L	110	75.0	125	----
Organic / Inorganic Carbon (QCLot: 479726)										
CG2205191-001	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	carbon, dissolved organic [DOC]	----	E358-L	5.23 mg/L	5 mg/L	105	70.0	130	----
Organic / Inorganic Carbon (QCLot: 479727)										
CG2205191-001	RG_LISP24_WS_LAEMP_LCO_2022-04_NP	carbon, total organic [TOC]	----	E355-L	5.54 mg/L	5 mg/L	111	70.0	130	----
Total Metals (QCLot: 480804)										
CG2205168-002	Anonymous	mercury, total	7439-97-6	E508-L	4.39 ng/L	5 ng/L	87.8	70.0	130	----
Total Metals (QCLot: 482521)										
CG2205187-003	Anonymous	aluminum, total	7429-90-5	E420	0.178 mg/L	0.2 mg/L	89.3	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 482521) - continued										
CG2205187-003	Anonymous	antimony, total	7440-36-0	E420	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0398 mg/L	0.04 mg/L	99.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00928 mg/L	0.01 mg/L	92.8	70.0	130	----
		boron, total	7440-42-8	E420	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00397 mg/L	0.004 mg/L	99.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0189 mg/L	0.02 mg/L	94.6	70.0	130	----
		copper, total	7440-50-8	E420	0.0188 mg/L	0.02 mg/L	94.0	70.0	130	----
		iron, total	7439-89-6	E420	1.92 mg/L	2 mg/L	96.2	70.0	130	----
		lead, total	7439-92-1	E420	0.0186 mg/L	0.02 mg/L	92.9	70.0	130	----
		lithium, total	7439-93-2	E420	0.0993 mg/L	0.1 mg/L	99.3	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0199 mg/L	0.02 mg/L	99.3	70.0	130	----
		nickel, total	7440-02-0	E420	0.0375 mg/L	0.04 mg/L	93.7	70.0	130	----
		potassium, total	7440-09-7	E420	4.00 mg/L	4 mg/L	100	70.0	130	----
		selenium, total	7782-49-2	E420	0.0416 mg/L	0.04 mg/L	104	70.0	130	----
		silicon, total	7440-21-3	E420	9.36 mg/L	10 mg/L	93.6	70.0	130	----
		silver, total	7440-22-4	E420	0.00399 mg/L	0.004 mg/L	99.7	70.0	130	----
		sodium, total	7440-23-5	E420	2.05 mg/L	2 mg/L	102	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00381 mg/L	0.004 mg/L	95.3	70.0	130	----
		tin, total	7440-31-5	E420	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		titanium, total	7440-32-6	E420	0.0390 mg/L	0.04 mg/L	97.5	70.0	130	----
		uranium, total	7440-61-1	E420	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		vanadium, total	7440-62-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.388 mg/L	0.4 mg/L	97.1	70.0	130	----
Total Metals (QCLot: 482522)										
CG2205187-003	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0397 mg/L	0.04 mg/L	99.2	70.0	130	----
Dissolved Metals (QCLot: 481456)										
CG2205187-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000944 mg/L	0.0001 mg/L	94.4	70.0	130	----
Dissolved Metals (QCLot: 483085)										

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: 483085) - continued										
CG2205191-002	RG_LI24_WS_LAEMP_LCO_2022-04_NP	aluminum, dissolved	7429-90-5	E421	0.183 mg/L	0.2 mg/L	91.3	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0372 mg/L	0.04 mg/L	93.1	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00834 mg/L	0.01 mg/L	83.4	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.096 mg/L	0.1 mg/L	95.6	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00380 mg/L	0.004 mg/L	94.9	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0179 mg/L	0.02 mg/L	89.6	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0177 mg/L	0.02 mg/L	88.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.86 mg/L	2 mg/L	93.2	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0179 mg/L	0.02 mg/L	89.6	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0878 mg/L	0.1 mg/L	87.8	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0183 mg/L	0.02 mg/L	91.4	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0356 mg/L	0.04 mg/L	89.1	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.82 mg/L	4 mg/L	95.6	70.0	130	----
		selenium, dissolved	7782-49-2	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.39 mg/L	10 mg/L	93.9	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00390 mg/L	0.004 mg/L	97.5	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00365 mg/L	0.004 mg/L	91.2	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0387 mg/L	0.04 mg/L	96.7	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00399 mg/L	0.004 mg/L	99.8	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0960 mg/L	0.1 mg/L	96.0	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.360 mg/L	0.4 mg/L	90.1	70.0	130	----
Dissolved Metals (QCLot: 483086)										
CG2205191-002	RG_LI24_WS_LAEMP_LCO_2022-04_NP	chromium, dissolved	7440-47-3	E421.Cr-L	0.0378 mg/L	0.04 mg/L	94.6	70.0	130	----

Teck

COC ID: REP_LAEMP_LCO_2022_APR_ALS | TURNAROUND TIME: Regular | RUSH: N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1:	aquascilab@teck.com	X	X	X
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Address	421 Pine Ave			Address	2559 29 Street NE			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	Jessica.Ritz@Teck.com	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Tyler.Mehler@Minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6:	lbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	403 407 1794			PO number	VPO00816101			

SAMPLE DETAILS — ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIL.	F	N	F	N	F	N	N					
								PRESERV.	H2SO4	H2SO4	HCL	NONE	HNO3	HNO3	NONE					
								ANALYSIS	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	HG-T-U-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-METNHG-T-CL	TECKCOAL-ROUTINE-VA					
RG_LISP24_WS_LAEMP_LCO_2022-04-NP	RG_LISP24	WS	NO	2022-05-03	09:00	G	7		X	X	X	X	X	X	X					
RG_LI24_WS_LAEMP_LCO_2022-04-NP	RG_LI24	WS	NO	2022-05-03	11:15	G	7		X	X	X	X	X	X	X					
RG_SLINE_WS_LAEMP_LCO_2022-04-NP	RG_SLINE	WS	NO	2022-05-03	13:30	G	7		X	X	X	X	X	X	X					
RG_RIVER_WS_LAEMP_LCO_2022-04-NP	RG_RIVER	WS	NO	2022-05-03	15:30	G	7		X	X	X	X	X	X	X					
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														

Environmental Division
Calgary
Work Order Reference
CG2205191

Telephone : +1 403 407 1800

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
~~Please include DL for fieldblanks~~	Rick Smit / Lotic Environmental	2022 05 03 17:00		5/4 10:35

SERVICE REQUEST (rush - subject to availability)					
Regular (default) X	Sampler's Name	Rick Smit	Mobile #	403-586-3241	
Priority (2-3 business days) - 50% surcharge	Sampler's Signature		Date/Time	2022 05 03	17:00
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

5c

WATER CHEMISTRY

ALS Laboratory Report CG2205354

(Finalized May 17, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2205354**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 05-May-2022 10:20
PO	: VPO00816101	Date Analysis Commenced	: 06-May-2022
C-O-C number	: REP_LAEMP_ICO_2022_APR_ALS	Issue Date	: 17-May-2022 14:39
Sampler	: Emma Thompson		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Christopher Li	Lab Assistant	Metals, Burnaby, British Columbia
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kyle Chang	Lab Assistant	Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Owen Cheng		Metals, Burnaby, British Columbia
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Inorganics, Calgary, Alberta
Zakieh Lalonde		Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
HTD	*Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*
RRV	*Reported result verified by repeat analysis.*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	RG_LI8_WS_LAEMP_LCO_2022-04_NP	RG_FO23_WS_LAEMP_LCO_2022-04_NP	RG_TRIP_WS_LAEMP_LCO_2022-04_NP	----
					Client sampling date / time	04-May-2022 10:30	04-May-2022 09:30	04-May-2022 07:30	04-May-2022 16:00	----
						CG2205354-001	CG2205354-002	CG2205354-003	CG2205354-004	--------
						Result	Result	Result	Result	----
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	<2.0	<2.0	<2.0	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		193	171	187	<1.0	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		235	209	228	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		7.2	7.0	6.8	<1.0	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		4.3	4.2	4.1	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		200	178	194	<1.0	----
conductivity	----	E100	2.0	µS/cm		776	681	772	<2.0	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		391	333	390	<0.50	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV		296	493	465	513	----
pH	----	E108	0.10	pH units		8.40	8.42	8.40	5.92	----
solids, total dissolved [TDS]	----	E162	10	mg/L		606	452	540	<10	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		1.8	3.6	13.8	<1.0	----
turbidity	----	E121	0.10	NTU		0.60	0.63	1.16	<0.10	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		9.62	7.99	4.20	<0.10	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.217	0.241	0.176	<0.020	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		1.60	1.57	1.10 TKNI	<0.050	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		7.92	6.53	11.5	<0.0050 HTD	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0019	0.0014	0.0044	<0.0010	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0011	<0.0010	<0.0010	<0.0010	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0063	0.0056	0.0114	<0.0020	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		220	184	214	<0.30	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		1.26	1.06	1.30	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		1.24	1.16	1.65	<0.50	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	RG_LI8_WS_LAEMP_LCO_2022-04_NP	RG_FO23_WS_LAEMP_LCO_2022-04_NP	RG_TRIP_WS_LAEMP_LCO_2022-04_NP	----
					Client sampling date / time	04-May-2022 10:30	04-May-2022 09:30	04-May-2022 07:30	04-May-2022 16:00	----
						CG2205354-001	CG2205354-002	CG2205354-003	CG2205354-004	--------
						Result	Result	Result	Result	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		9.42	8.09	9.28	<0.10	----
cation sum	----	EC101	0.10	meq/L		8.13	6.92	7.96	<0.10	----
ion balance (cations/anions)	----	EC101	0.010	%		86.3	85.5	85.8	100 RRV	----
ion balance (APHA)	----	EC101	0.010	%		7.35	7.79	7.66	<0.010	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0244	0.0201	0.0566	<0.0030	----
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00020	0.00017	0.00015	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00013	0.00014	0.00016	<0.00010	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0626	0.0553	0.0891	<0.00010	----
beryllium, total	7440-41-7	E420	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.013	0.011	<0.010	<0.010	----
cadmium, total	7440-43-9	E420	0.0050	µg/L		0.108	0.0838	0.0468	<0.0050	----
calcium, total	7440-70-2	E420	0.050	mg/L		94.0	82.3	96.2	<0.050	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00016	0.00018	0.00060	<0.00010	----
cobalt, total	7440-48-4	E420	0.10	µg/L		<0.10	<0.10	0.10	<0.10	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
iron, total	7439-89-6	E420	0.010	mg/L		0.038	0.028	0.107	<0.010	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	0.000087	<0.000050	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0383	0.0307	0.0259	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		40.1	34.7	41.9	<0.0050	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00631	0.00449	0.00873	<0.00010	----
mercury, total	7439-97-6	E508-L	0.00050	µg/L		0.00058	0.00059	0.00090	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00202	0.00200	0.00152	<0.000050	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00368	0.00315	0.00209	<0.00050	----
potassium, total	7440-09-7	E420	0.050	mg/L		1.23	1.04	1.30	<0.050	----
selenium, total	7782-49-2	E420	0.050	µg/L		38.4	30.8	46.5	<0.050	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.45	2.09	2.19	<0.10	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		6.40	5.43	3.39	<0.050	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	RG_LI8_WS_LAEMP_LCO_2022-04_NP	RG_FO23_WS_LAEMP_LCO_2022-04_NP	RG_TRIP_WS_LAEMP_LCO_2022-04_NP	----
Client sampling date / time					04-May-2022 10:30	04-May-2022 09:30	04-May-2022 07:30	04-May-2022 16:00	----
					CG2205354-001	CG2205354-002	CG2205354-003	CG2205354-004	--------
					Result	Result	Result	Result	----
Total Metals									
strontium, total	7440-24-6	E420	0.00020	mg/L	0.206	0.185	0.168	<0.00020	----
sulfur, total	7704-34-9	E420	0.50	mg/L	78.6	66.0	76.6	<0.50	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00048	0.00052	0.00088	<0.00030	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00309	0.00272	0.00255	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0044	0.0039	<0.0030	<0.0030	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0011	0.0013	<0.0010	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00020	0.00017	0.00014	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00011	0.00012	0.00010	<0.00010	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0593	0.0522	0.0821	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	<0.020	<0.020	<0.020	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.013	0.011	<0.010	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.0884	0.0466	0.0208	<0.0050	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	91.4	78.9	89.4	<0.050	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00013	0.00013	0.00010	<0.00010	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00021	0.00023	0.00022	<0.00020	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0373	0.0310	0.0268	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	39.5	33.1	40.4	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00160	0.00093	0.00103	<0.00010	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00205	0.00178	0.00154	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00344	0.00277	0.00167	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.21	1.01	1.26	<0.050	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	RG_LI8_WS_LAEMP_LCO_2022-04_NP	RG_FO23_WS_LAEMP_LCO_2022-04_NP	RG_TRIP_WS_LAEMP_LCO_2022-04_NP	----
					Client sampling date / time	04-May-2022 10:30	04-May-2022 09:30	04-May-2022 07:30	04-May-2022 16:00	----
						CG2205354-001	CG2205354-002	CG2205354-003	CG2205354-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
selenium, dissolved	7782-49-2	E421	0.050	µg/L		40.2	32.3	51.2	<0.050	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.32	2.02	2.11	<0.050	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		6.68	5.40	3.42	<0.050	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.206	0.185	0.164	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		78.6	65.1	77.5	<0.50	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00307	0.00266	0.00249	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0037	0.0035	0.0011	0.0011 RRV	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2205354**	Page	: 1 of 22
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 05-May-2022 10:20
PO	: VPO00816101	Issue Date	: 17-May-2022 14:39
C-O-C number	: REP_LAEMP_ICO_2022_APR_ALS		
Sampler	: Emma Thompson		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Total Metals	QC-MRG3-4837010 01	----	aluminum, total	7429-90-5	E420	0.0035 MB-LOR mg/L	0.003 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_FO23_WS_LAEMP_LCO_2022-04_NP	E298	04-May-2022	06-May-2022	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LI8_WS_LAEMP_LCO_2022-04_NP	E298	04-May-2022	06-May-2022	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E298	04-May-2022	06-May-2022	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E298	04-May-2022	06-May-2022	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_FO23_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_LI8_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E235.Br-L	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_FO23_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E235.Cl-L	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_FO23_WS_LAEMP_LCO_2022-04_NP	E378-U	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LI8_WS_LAEMP_LCO_2022-04_NP	E378-U	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E378-U	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E378-U	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_FO23_WS_LAEMP_LCO_2022-04_NP	E235.F	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LI8_WS_LAEMP_LCO_2022-04_NP	E235.F	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E235.F	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E235.F	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_FO23_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E235.NO3-L	04-May-2022	----	----	----		10-May-2022	3 days	6 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_FO23_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_LI8_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E235.NO2-L	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_FO23_WS_LAEMP_LCO_2022-04_NP	E235.SO4	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LI8_WS_LAEMP_LCO_2022-04_NP	E235.SO4	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E235.SO4	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E235.SO4	04-May-2022	----	----	----		06-May-2022	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_FO23_WS_LAEMP_LCO_2022-04_NP	E318	04-May-2022	10-May-2022	----	----		10-May-2022	28 days	6 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LI8_WS_LAEMP_LCO_2022-04_NP	E318	04-May-2022	10-May-2022	----	----		10-May-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E318	04-May-2022	10-May-2022	----	----		10-May-2022	28 days	6 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E318	04-May-2022	10-May-2022	----	----		10-May-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_FO23_WS_LAEMP_LCO_2022-04_NP	E372-U	04-May-2022	11-May-2022	----	----		11-May-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LI8_WS_LAEMP_LCO_2022-04_NP	E372-U	04-May-2022	11-May-2022	----	----		11-May-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E372-U	04-May-2022	11-May-2022	----	----		11-May-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E372-U	04-May-2022	11-May-2022	----	----		11-May-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_FO23_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	04-May-2022	12-May-2022	----	----		12-May-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_LI8_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	04-May-2022	12-May-2022	----	----		12-May-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	04-May-2022	12-May-2022	----	----		12-May-2022	180 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E421.Cr-L	04-May-2022	12-May-2022	----	----		12-May-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_FO23_WS_LAEMP_LCO_2022-04_NP	E509	04-May-2022	11-May-2022	----	----		11-May-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LI8_WS_LAEMP_LCO_2022-04_NP	E509	04-May-2022	11-May-2022	----	----		11-May-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E509	04-May-2022	11-May-2022	----	----		11-May-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_FO23_WS_LAEMP_LCO_2022-04_NP	E421	04-May-2022	12-May-2022	----	----		12-May-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_LI8_WS_LAEMP_LCO_2022-04_NP	E421	04-May-2022	12-May-2022	----	----		12-May-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E421	04-May-2022	12-May-2022	----	----		12-May-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E421	04-May-2022	12-May-2022	----	----		12-May-2022	180 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_FO23_WS_LAEMP_LCO_2022-04_NP	E358-L	04-May-2022	10-May-2022	----	----		12-May-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LI8_WS_LAEMP_LCO_2022-04_NP	E358-L	04-May-2022	10-May-2022	----	----		12-May-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E358-L	04-May-2022	10-May-2022	----	----		12-May-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_FO23_WS_LAEMP_LCO_2022-04_NP	E355-L	04-May-2022	10-May-2022	----	----		12-May-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LI8_WS_LAEMP_LCO_2022-04_NP	E355-L	04-May-2022	10-May-2022	----	----		12-May-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E355-L	04-May-2022	10-May-2022	----	----		12-May-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E355-L	04-May-2022	10-May-2022	----	----		12-May-2022	28 days	8 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_FO23_WS_LAEMP_LCO_2022-04_NP	E283	04-May-2022	----	----	----		09-May-2022	14 days	5 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_LI8_WS_LAEMP_LCO_2022-04_NP	E283	04-May-2022	----	----	----		09-May-2022	14 days	5 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E283	04-May-2022	----	----	----		09-May-2022	14 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Acidity by Titration										
HDPE										
RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E283	04-May-2022	----	----	----		09-May-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_FO23_WS_LAEMP_LCO_2022-04_NP	E290	04-May-2022	----	----	----		07-May-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_LI8_WS_LAEMP_LCO_2022-04_NP	E290	04-May-2022	----	----	----		07-May-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E290	04-May-2022	----	----	----		07-May-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E290	04-May-2022	----	----	----		07-May-2022	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
RG_FO23_WS_LAEMP_LCO_2022-04_NP	E100	04-May-2022	----	----	----		07-May-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
RG_LI8_WS_LAEMP_LCO_2022-04_NP	E100	04-May-2022	----	----	----		07-May-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E100	04-May-2022	----	----	----		07-May-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E100	04-May-2022	----	----	----		07-May-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : ORP by Electrode										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E125	04-May-2022	----	----	----		12-May-2022	0.25 hrs	191 hrs	✖ EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E125	04-May-2022	----	----	----		12-May-2022	0.25 hrs	196 hrs	✖ EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LI8_WS_LAEMP_LCO_2022-04_NP	E125	04-May-2022	----	----	----		12-May-2022	0.25 hrs	197 hrs	✖ EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_FO23_WS_LAEMP_LCO_2022-04_NP	E125	04-May-2022	----	----	----		12-May-2022	0.25 hrs	199 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E108	04-May-2022	----	----	----		07-May-2022	0.25 hrs	71 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E108	04-May-2022	----	----	----		07-May-2022	0.25 hrs	77 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LI8_WS_LAEMP_LCO_2022-04_NP	E108	04-May-2022	----	----	----		07-May-2022	0.25 hrs	78 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_FO23_WS_LAEMP_LCO_2022-04_NP	E108	04-May-2022	----	----	----		07-May-2022	0.25 hrs	80 hrs	✖ EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_FO23_WS_LAEMP_LCO_2022-04_NP	E162	04-May-2022	----	----	----		10-May-2022	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE RG_LI8_WS_LAEMP_LCO_2022-04_NP	E162	04-May-2022	----	----	----		10-May-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E162	04-May-2022	----	----	----		10-May-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E162	04-May-2022	----	----	----		10-May-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_FO23_WS_LAEMP_LCO_2022-04_NP	E160-L	04-May-2022	----	----	----		11-May-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-04_NP	E160-L	04-May-2022	----	----	----		11-May-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E160-L	04-May-2022	----	----	----		11-May-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E160-L	04-May-2022	----	----	----		11-May-2022	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_FO23_WS_LAEMP_LCO_2022-04_NP	E121	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LI8_WS_LAEMP_LCO_2022-04_NP	E121	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E121	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E121	04-May-2022	----	----	----		06-May-2022	3 days	2 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid)										
RG_FO23_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	04-May-2022	----	----	----		12-May-2022	180 days	8 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid)										
RG_LI8_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	04-May-2022	----	----	----		12-May-2022	180 days	8 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	04-May-2022	----	----	----		12-May-2022	180 days	8 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E420.Cr-L	04-May-2022	----	----	----		12-May-2022	180 days	8 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved)										
RG_FO23_WS_LAEMP_LCO_2022-04_NP	E508-L	04-May-2022	----	----	----		12-May-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved)										
RG_LI8_WS_LAEMP_LCO_2022-04_NP	E508-L	04-May-2022	----	----	----		12-May-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved)										
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E508-L	04-May-2022	----	----	----		12-May-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_FO23_WS_LAEMP_LCO_2022-04_NP	E420	04-May-2022	----	----	----		12-May-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_LI8_WS_LAEMP_LCO_2022-04_NP	E420	04-May-2022	----	----	----		12-May-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	E420	04-May-2022	----	----	----		12-May-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_TRIP_WS_LAEMP_LCO_2022-04_NP	E420	04-May-2022	----	----	----		12-May-2022	180 days	8 days	✓

Legend & Qualifier Definitions

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

EHT: Exceeded ALS recommended hold time prior to analysis.

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	481373	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	480606	2	39	5.1	5.0	✓
Ammonia by Fluorescence	E298	479915	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	479607	1	8	12.5	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	479608	1	19	5.2	5.0	✓
Conductivity in Water	E100	480605	2	40	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	485277	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	483546	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	485275	1	12	8.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	483189	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	479684	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	479605	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	479609	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	479610	1	19	5.2	5.0	✓
ORP by Electrode	E125	485973	2	23	8.7	5.0	✓
pH by Meter	E108	480604	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	479606	1	8	12.5	5.0	✓
TDS by Gravimetry	E162	481133	2	26	7.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	483702	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	481589	1	19	5.2	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	485189	1	15	6.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	483701	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	483190	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	480192	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	479699	3	45	6.6	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	481373	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	480606	2	39	5.1	5.0	✓
Ammonia by Fluorescence	E298	479915	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	479607	1	8	12.5	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	479608	1	19	5.2	5.0	✓
Conductivity in Water	E100	480605	2	40	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	485277	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	483546	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	485275	1	12	8.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	483189	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	479684	1	19	5.2	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	479605	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	479609	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	479610	1	19	5.2	5.0	✓
ORP by Electrode	E125	485973	2	23	8.7	5.0	✓
pH by Meter	E108	480604	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	479606	1	8	12.5	5.0	✓
TDS by Gravimetry	E162	481133	2	26	7.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	483702	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	481589	1	19	5.2	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	485189	1	15	6.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	483701	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	483190	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	480192	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	481140	1	13	7.6	5.0	✓
Turbidity by Nephelometry	E121	479699	3	45	6.6	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	481373	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	480606	2	39	5.1	5.0	✓
Ammonia by Fluorescence	E298	479915	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	479607	1	8	12.5	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	479608	1	19	5.2	5.0	✓
Conductivity in Water	E100	480605	2	40	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	485277	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	483546	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	485275	1	12	8.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	483189	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	479684	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	479605	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	479609	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	479610	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	479606	1	8	12.5	5.0	✓
TDS by Gravimetry	E162	481133	2	26	7.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	483702	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	481589	1	19	5.2	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	485189	1	15	6.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	483701	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	483190	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	480192	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	481140	1	13	7.6	5.0	✓
Turbidity by Nephelometry	E121	479699	3	45	6.6	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	479915	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	479607	1	8	12.5	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	479608	1	19	5.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	485277	1	6	16.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	483546	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	485275	1	12	8.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	483189	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	479684	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	479605	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	479609	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	479610	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	479606	1	8	12.5	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	483702	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	481589	1	19	5.2	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	485189	1	15	6.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	483701	2	20	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	483190	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	480192	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAFS.
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			

QUALITY CONTROL REPORT

Work Order	: **CG2205354**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 05-May-2022 10:20
PO	: VPO00816101	Date Analysis Commenced	: 06-May-2022
C-O-C number	: REP_LAEMP_ICO_2022_APR_ALS	Issue Date	: 17-May-2022 14:39
Sampler	: Emma Thompson		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Caleb Deroche	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Christopher Li	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kyle Chang	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
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Ruifang Zheng	Analyst	Calgary Inorganics, Calgary, Alberta
Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Shirley Li		Calgary Inorganics, Calgary, Alberta
Zakieh Lalonde		Calgary Inorganics, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 479699)											
CG2205207-001	Anonymous	turbidity	----	E121	0.10	NTU	0.20	0.19	0.01	Diff <2x LOR	----
Physical Tests (QC Lot: 479700)											
CG2205275-003	Anonymous	turbidity	----	E121	0.10	NTU	5.40	5.95	9.65%	15%	----
Physical Tests (QC Lot: 479705)											
CG2205354-004	RG_TRIP_WS_LAEMP_LCO_2022-04_NP	turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 480604)											
CG2205328-002	Anonymous	pH	----	E108	0.10	pH units	8.23	8.23	0.00%	4%	----
Physical Tests (QC Lot: 480605)											
CG2205328-002	Anonymous	conductivity	----	E100	2.0	µS/cm	345	343	0.581%	10%	----
Physical Tests (QC Lot: 480606)											
CG2205328-002	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	152	159	4.63%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	152	159	4.63%	20%	----
Physical Tests (QC Lot: 480607)											
CG2205354-003	RG_FO23_WS_LAEMP_LCO_2022-04_NP	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	187	191	1.75%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	6.8	6.8	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	194	197	1.68%	20%	----
Physical Tests (QC Lot: 480608)											
CG2205354-003	RG_FO23_WS_LAEMP_LCO_2022-04_NP	pH	----	E108	0.10	pH units	8.40	8.39	0.119%	4%	----
Physical Tests (QC Lot: 480609)											
CG2205354-003	RG_FO23_WS_LAEMP_LCO_2022-04_NP	conductivity	----	E100	2.0	µS/cm	772	773	0.129%	10%	----
Physical Tests (QC Lot: 481133)											
CG2205330-007	Anonymous	solids, total dissolved [TDS]	----	E162	40	mg/L	3520	3510	0.114%	20%	----
Physical Tests (QC Lot: 481134)											
CG2205354-003	RG_FO23_WS_LAEMP_LCO_2022-04_NP	solids, total dissolved [TDS]	----	E162	20	mg/L	540	577	6.62%	20%	----
Physical Tests (QC Lot: 481373)											
CG2205336-001	Anonymous	acidity (as CaCO3)	----	E283	10.0	mg/L	53.4	50.7	2.7	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 485973)											
CG2205330-006	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	456	449	1.39%	15%	----
Physical Tests (QC Lot: 485974)											
CG2205354-002	RG_LI8_WS_LAEMP_LCO_2022-04_NP	oxidation-reduction potential [ORP]	----	E125	0.10	mV	493	505	2.34%	15%	----
Anions and Nutrients (QC Lot: 479605)											
CG2205335-003	Anonymous	fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 479606)											
CG2205335-003	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	1220	1220	0.266%	20%	----
Anions and Nutrients (QC Lot: 479607)											
CG2205335-003	Anonymous	bromide	24959-67-9	E235.Br-L	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 479608)											
CG2205335-003	Anonymous	chloride	16887-00-6	E235.Cl-L	2.00	mg/L	44.1	43.7	0.754%	20%	----
Anions and Nutrients (QC Lot: 479609)											
CG2205335-003	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	157	158	0.0989%	20%	----
Anions and Nutrients (QC Lot: 479610)											
CG2205335-003	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	0.129	0.126	0.0031	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 479684)											
CG2205298-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 479915)											
CG2205336-005	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.125	mg/L	2.39	2.43	1.36%	20%	----
Anions and Nutrients (QC Lot: 480192)											
CG2205335-005	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0026	0.0024	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 481589)											
CG2205311-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 483189)											
CG2205336-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	10.0	mg/L	214	229	7.05%	20%	----
Organic / Inorganic Carbon (QC Lot: 483190)											
CG2205336-001	Anonymous	carbon, total organic [TOC]	----	E355-L	10.0	mg/L	231	217	6.01%	20%	----
Total Metals (QC Lot: 483701)											
YL2200404-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0636	0.0658	3.55%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00028	0.00028	0.0000006	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00090	0.00090	0.000002	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0454	0.0451	0.627%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

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: 483701) - continued											
YL2200404-001	Anonymous	boron, total	7440-42-8	E420	0.010	mg/L	1.20	1.18	0.845%	20%	----
		cadmium, total	7440-43-9	E420	0.0000100	mg/L	<0.0000100	<0.0000100	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	429	430	0.206%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00046	0.00043	0.00003	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00244	0.00242	0.00002	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.181	0.184	1.16%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0729	0.0713	2.24%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	118	118	0.248%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.130	0.132	1.60%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0267	0.0264	1.12%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.0162	0.0164	1.54%	20%	----
		potassium, total	7440-09-7	E420	0.050	mg/L	21.3	21.9	2.72%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000068	<0.000050	0.000018	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	5.11	5.11	0.0442%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	347	358	3.10%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	8.34	8.18	1.85%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	151	151	0.185%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00120	mg/L	<0.00120	<0.00120	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.0127	0.0128	1.07%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00068	0.00070	0.00002	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Total Metals (QC Lot: 483702)											
YL2200404-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00054	0.00054	0.0000010	Diff <2x LOR	----
Total Metals (QC Lot: 485189)											
CG2205330-001	Anonymous	mercury, total	7439-97-6	E508-L	0.50	ng/L	<0.00050 µg/L	<0.50	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 483546)											
CG2205324-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 485275)											
CG2205353-003	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0025	0.0023	0.0002	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00046	0.00051	0.00005	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: 485275) - continued											
CG2205353-003	Anonymous	barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0613	0.0612	0.320%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0050 µg/L	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	40.7	40.9	0.459%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00041	0.00042	0.00001	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.010	0.010	0.0001	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000088	0.000088	0.00000005	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0035	0.0034	0.00007	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	13.3	13.1	1.45%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00580	0.00575	0.861%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000766	0.000755	1.48%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.656	0.667	1.68%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	2.79 µg/L	0.00268	3.97%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.52	2.46	2.68%	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	4.86	4.88	0.300%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.170	0.169	0.152%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	15.0	15.0	0.247%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000863	0.000871	0.916%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 485277)											
CG2205353-003	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	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: 479699)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 479700)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 479705)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 480605)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 480606)						
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: 480607)						
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: 480609)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 481133)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 481134)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 481140)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 481373)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Anions and Nutrients (QCLot: 479605)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 479606)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 479607)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 479608)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 479609)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 479610)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 479684)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 479915)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 480192)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 481589)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 483189)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 483190)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 483701)						
aluminum, total	7429-90-5	E420	0.003	mg/L	# 0.0035	MB-LOR
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 483701) - continued						
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
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	----
Total Metals (QCLot: 483702)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 485189)						
mercury, total	7439-97-6	E508-L	0.5	ng/L	<0.50	----
Dissolved Metals (QCLot: 483546)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 485275)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 485275) - continued						
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
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	----
Dissolved Metals (QCLot: 485277)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----

Qualifiers

Qualifier	Description
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 479699)									
turbidity	----	E121	0.1	NTU	200 NTU	100.0	85.0	115	----
Physical Tests (QCLot: 479700)									
turbidity	----	E121	0.1	NTU	200 NTU	102	85.0	115	----
Physical Tests (QCLot: 479705)									
turbidity	----	E121	0.1	NTU	200 NTU	106	85.0	115	----
Physical Tests (QCLot: 480604)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 480605)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	102	90.0	110	----
Physical Tests (QCLot: 480606)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	101	85.0	115	----
Physical Tests (QCLot: 480607)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	102	85.0	115	----
Physical Tests (QCLot: 480608)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 480609)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	103	90.0	110	----
Physical Tests (QCLot: 481133)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	90.1	85.0	115	----
Physical Tests (QCLot: 481134)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	99.0	85.0	115	----
Physical Tests (QCLot: 481140)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	92.6	85.0	115	----
Physical Tests (QCLot: 481373)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	104	85.0	115	----
Physical Tests (QCLot: 485973)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	104	95.4	104	----
Physical Tests (QCLot: 485974)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	104	95.4	104	----
Anions and Nutrients (QCLot: 479605)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 479606)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 479606) - continued									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 479607)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	99.4	85.0	115	----
Anions and Nutrients (QCLot: 479608)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 479609)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 479610)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 479684)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	104	80.0	120	----
Anions and Nutrients (QCLot: 479915)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	90.5	85.0	115	----
Anions and Nutrients (QCLot: 480192)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	110	80.0	120	----
Anions and Nutrients (QCLot: 481589)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	98.3	75.0	125	----
Organic / Inorganic Carbon (QCLot: 483189)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	97.8	80.0	120	----
Organic / Inorganic Carbon (QCLot: 483190)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Total Metals (QCLot: 483701)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	95.9	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.0	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.0	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	89.2	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	99.8	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	100	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	107	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	103	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 483701) - continued									
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.0	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	97.8	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	100	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	108	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	93.4	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	108	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.5	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	104	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.5	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	103	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	104	80.0	120	----
Total Metals (QCLot: 483702)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	99.4	80.0	120	----
Total Metals (QCLot: 485189)									
mercury, total	7439-97-6	E508-L	0.5	ng/L	5 ng/L	92.8	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 485275)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	100	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	99.8	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	96.5	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	100	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	109	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 485275) - continued									
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.3	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	101	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	95.9	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.3	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	103	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	110	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.0	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	106	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	97.8	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	92.6	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	101	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	100	80.0	120	----
Dissolved Metals (QCLot: 485277)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	97.6	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 479605)										
CG2205354-004	RG_TRIP_WS_LAEMP_LCO_2022-04_NP	fluoride	16984-48-8	E235.F	0.950 mg/L	1 mg/L	95.0	75.0	125	----
Anions and Nutrients (QCLot: 479606)										
CG2205354-004	RG_TRIP_WS_LAEMP_LCO_2022-04_NP	sulfate (as SO4)	14808-79-8	E235.SO4	92.7 mg/L	100 mg/L	92.7	75.0	125	----
Anions and Nutrients (QCLot: 479607)										
CG2205354-004	RG_TRIP_WS_LAEMP_LCO_2022-04_NP	bromide	24959-67-9	E235.Br-L	0.439 mg/L	0.5 mg/L	87.9	75.0	125	----
Anions and Nutrients (QCLot: 479608)										
CG2205354-004	RG_TRIP_WS_LAEMP_LCO_2022-04_NP	chloride	16887-00-6	E235.Cl-L	91.4 mg/L	100 mg/L	91.4	75.0	125	----
Anions and Nutrients (QCLot: 479609)										
CG2205354-004	RG_TRIP_WS_LAEMP_LCO_2022-04_NP	nitrate (as N)	14797-55-8	E235.NO3-L	2.32 mg/L	2.5 mg/L	92.8	75.0	125	----
Anions and Nutrients (QCLot: 479610)										
CG2205354-004	RG_TRIP_WS_LAEMP_LCO_2022-04_NP	nitrite (as N)	14797-65-0	E235.NO2-L	0.464 mg/L	0.5 mg/L	92.7	75.0	125	----
Anions and Nutrients (QCLot: 479684)										
CG2205298-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0548 mg/L	0.05 mg/L	110	70.0	130	----
Anions and Nutrients (QCLot: 479915)										
CG2205336-006	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 480192)										
CG2205336-001	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.0676 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 481589)										
CG2205312-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.25 mg/L	2.5 mg/L	90.1	70.0	130	----
Organic / Inorganic Carbon (QCLot: 483189)										
CG2205336-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 483190)										
CG2205336-001	Anonymous	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 483701)										
YL2200404-002	Anonymous	aluminum, total	7429-90-5	E420	0.189 mg/L	0.2 mg/L	94.5	70.0	130	----
		magnesium, total	7439-95-4	E420	0.954 mg/L	1 mg/L	95.4	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 483701) - continued										
YL2200404-002	Anonymous	strontium, total	7440-24-6	E420	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
YL2200404-002	Anonymous	antimony, total	7440-36-0	E420	0.0199 mg/L	0.02 mg/L	99.7	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		barium, total	7440-39-3	E420	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0377 mg/L	0.04 mg/L	94.2	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00978 mg/L	0.01 mg/L	97.8	70.0	130	----
		boron, total	7440-42-8	E420	0.083 mg/L	0.1 mg/L	82.7	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00388 mg/L	0.004 mg/L	97.1	70.0	130	----
		calcium, total	7440-70-2	E420	3.68 mg/L	4 mg/L	92.0	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		copper, total	7440-50-8	E420	0.0197 mg/L	0.02 mg/L	98.3	70.0	130	----
		iron, total	7439-89-6	E420	1.90 mg/L	2 mg/L	95.2	70.0	130	----
		lead, total	7439-92-1	E420	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		lithium, total	7439-93-2	E420	0.0895 mg/L	0.1 mg/L	89.5	70.0	130	----
		manganese, total	7439-96-5	E420	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		nickel, total	7440-02-0	E420	0.0392 mg/L	0.04 mg/L	98.1	70.0	130	----
		potassium, total	7440-09-7	E420	3.81 mg/L	4 mg/L	95.2	70.0	130	----
		selenium, total	7782-49-2	E420	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		silicon, total	7440-21-3	E420	9.54 mg/L	10 mg/L	95.4	70.0	130	----
		silver, total	7440-22-4	E420	0.00415 mg/L	0.004 mg/L	104	70.0	130	----
		sodium, total	7440-23-5	E420	1.91 mg/L	2 mg/L	95.7	70.0	130	----
		sulfur, total	7704-34-9	E420	19.6 mg/L	20 mg/L	98.0	70.0	130	----
		thallium, total	7440-28-0	E420	0.00380 mg/L	0.004 mg/L	94.9	70.0	130	----
		tin, total	7440-31-5	E420	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		titanium, total	7440-32-6	E420	0.0373 mg/L	0.04 mg/L	93.2	70.0	130	----
		uranium, total	7440-61-1	E420	0.00380 mg/L	0.004 mg/L	95.1	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0956 mg/L	0.1 mg/L	95.6	70.0	130	----
		zinc, total	7440-66-6	E420	0.397 mg/L	0.4 mg/L	99.3	70.0	130	----
Total Metals (QCLot: 483702)										
YL2200404-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0383 mg/L	0.04 mg/L	95.8	70.0	130	----
Total Metals (QCLot: 485189)										
CG2205330-002	Anonymous	mercury, total	7439-97-6	E508-L	3.79 ng/L	5 ng/L	75.9	70.0	130	----
Dissolved Metals (QCLot: 483546)										
CG2205324-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000950 mg/L	0.0001 mg/L	95.0	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 485275)										
CG2205353-004	Anonymous	aluminum, dissolved	7429-90-5	E421	0.188 mg/L	0.2 mg/L	93.8	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0384 mg/L	0.04 mg/L	96.1	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00880 mg/L	0.01 mg/L	88.0	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.100 mg/L	0.1 mg/L	99.6	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0184 mg/L	0.02 mg/L	92.3	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0183 mg/L	0.02 mg/L	91.7	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.91 mg/L	2 mg/L	95.4	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0189 mg/L	0.02 mg/L	94.7	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0910 mg/L	0.1 mg/L	91.0	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0185 mg/L	0.02 mg/L	92.7	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0373 mg/L	0.04 mg/L	93.2	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.77 mg/L	4 mg/L	94.2	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0423 mg/L	0.04 mg/L	106	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.61 mg/L	10 mg/L	96.1	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	20.0 mg/L	20 mg/L	100	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00379 mg/L	0.004 mg/L	94.8	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0361 mg/L	0.04 mg/L	90.2	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00392 mg/L	0.004 mg/L	97.9	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0974 mg/L	0.1 mg/L	97.4	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.382 mg/L	0.4 mg/L	95.6	70.0	130	----
Dissolved Metals (QCLot: 485277)										
CG2205353-004	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0374 mg/L	0.04 mg/L	93.4	70.0	130	----

Teck

COC ID: REP_LAEMP_LCO_2022_APR_ALS | TURNAROUND TIME: Regular | RUSH: N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1:	aquascilab@teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	2559 29 Street NE			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	Jessica.Ritz@Teck.com	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Tyler.Mehler@Minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6:	lbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	403 407 1794			PO number	VPO00816101			

SAMPLE DETAILS — ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Fil.	F	N	F	N	F	N	N
								PRESERV.	H2SO4	H2SO4	HCL	NONE	HNO3	HNO3	NONE
								ANALYSIS	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	HG-T-U-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-METNHG-T-CL	TECKCOAL-ROUTINE-VA
RG_LIDCOM_WS_LAEMP_LCO_2022-04-NP	RG_LIDCOM	WS	NO	22/05/04	10:30	G	7		X	X	X	X	X	X	X
RG_L18_WS_LAEMP_LCO_2022-04-NP	RG_L18	WS	NO	22/05/04	09:30	G	7		X	X	X	X	X	X	X
RG_F023_WS_LAEMP_LCO_2022-04-NP	RG_F023	WS	NO	22/05/04	07:30	G	7		X	X	X	X	X	X	X
~~RG_LIDSL_WS_LAEMP_LCO_2022-04-NP~~	~~RG_LIDSL~~	~~WS~~	~~NO~~	~~22/05/04~~		~~G~~	~~7~~		~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~
RG_TRIP_WS_LAEMP_LCO_2022-04-NP	RG_TRIP	WS	NO	22/05/04	16:00	G	4			X			X	X	X
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									

Environmental Division Calgary
Work Order Reference
CG2205354

Telephone : +1 403 407 1800

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Please include DI for field blank			MH	5/5 10:20

SERVICE REQUEST (rush - subject to availability)

Regular (default)	X
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Emma Thompson	Mobile #	250 421 3572
Sampler's Signature	Emma Thompson	Date/Time	2022/05/04 15:00

4c

WATER CHEMISTRY

ALS Laboratory Report CG2209065
(Finalized July 20, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2209065**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 12-Jul-2022 09:40
PO	: VPO00816101	Date Analysis Commenced	: 12-Jul-2022
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS	Issue Date	: 20-Jul-2022 13:33
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anshim Anshim	Lab Assistant	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
HTD	*Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_F023_WS_LAEMP_LCO_2022-07_N	RG_L124_WS_LAEMP_LCO_2022-07_N	RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	RG_TRIP_WS_LAEMP_LCO_2022-07_NP	----
					Client sampling date / time	11-Jul-2022 15:30	11-Jul-2022 11:10	11-Jul-2022 09:00	11-Jul-2022 10:00	----
						CG2209065-001	CG2209065-002	CG2209065-003	CG2209065-004	--------
						Result	Result	Result	Result	----
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	<2.0	<2.0	2.0	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		158	107	<1.0	<1.0	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		192	130	<1.0	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		9.0	<1.0	<1.0	<1.0	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		5.4	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		166	107	<1.0	<1.0	----
conductivity	----	E100	2.0	µS/cm		491	233	<2.0	<2.0	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		268	119	<0.50	<0.50	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV		246	252	571	577	----
pH	----	E108	0.10	pH units		8.42	8.14	5.44	5.19	----
solids, total dissolved [TDS]	----	E162	10	mg/L		328	132	<10	<10	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		3.3	1.1	<1.0	<1.0	----
turbidity	----	E121	0.10	NTU		1.21	0.31	<0.10	<0.10	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		2.13	0.19	<0.10	<0.10	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.174	0.236	<0.020	<0.020	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		<0.500 DLM, TKNI	<0.500 DLM	<0.050	<0.050	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		5.83	0.147	<0.0050 HTD	<0.0050 HTD	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0040	<0.0010	<0.0010	<0.0010	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0050	0.0032	<0.0020	<0.0020	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		114	29.9	<0.30	<0.30	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		0.92	<0.50	<0.50	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		0.92	<0.50	<0.50	<0.50	----
Ion Balance										

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_F023_WS_LAEMP_LCO_2022-07_N	RG_L124_WS_LAEMP_LCO_2022-07_N	RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	RG_TRIP_WS_LAEMP_LCO_2022-07_NP	----
					Client sampling date / time	11-Jul-2022 15:30	11-Jul-2022 11:10	11-Jul-2022 09:00	11-Jul-2022 10:00	----
						CG2209065-001	CG2209065-002	CG2209065-003	CG2209065-004	--------
						Result	Result	Result	Result	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		6.18	2.79	<0.10	<0.10	----
cation sum	----	EC101	0.10	meq/L		5.48	2.44	<0.10	<0.10	----
ion balance (cations/anions)	----	EC101	0.010	%		88.7	87.4	100	100	----
ion balance (APHA)	----	EC101	0.010	%		6.00	6.69	<0.010	<0.010	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0192	0.0073	<0.0030	<0.0030	----
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00016	<0.00010	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00015	0.00020	<0.00010	<0.00010	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0562	0.0332	<0.00010	<0.00010	----
beryllium, total	7440-41-7	E420	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	----
cadmium, total	7440-43-9	E420	0.0050	µg/L		0.0678	0.0108	<0.0050	<0.0050	----
calcium, total	7440-70-2	E420	0.050	mg/L		67.8	36.5	<0.050	<0.050	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00011	0.00018	<0.00010	<0.00010	----
cobalt, total	7440-48-4	E420	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
iron, total	7439-89-6	E420	0.010	mg/L		0.030	<0.010	<0.010	<0.010	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0202	0.0029	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		27.8	8.39	<0.0050	<0.0050	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00396	0.00026	<0.00010	<0.00010	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00130	0.000686	<0.000050	<0.000050	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00171	0.00077	<0.00050	<0.00050	----
potassium, total	7440-09-7	E420	0.050	mg/L		1.03	0.230	<0.050	<0.050	----
selenium, total	7782-49-2	E420	0.050	µg/L		24.7	1.90	<0.050	<0.050	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.02	1.55	<0.10	<0.10	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		2.28	0.962	<0.050	<0.050	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.115	0.0972	<0.00020	<0.00020	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_F023_WS_LAEMP_LCO_2022-07_N	RG_L124_WS_LAEMP_LCO_2022-07_N	RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	RG_TRIP_WS_LAEMP_LCO_2022-07_NP	----
					Client sampling date / time	11-Jul-2022 15:30	11-Jul-2022 11:10	11-Jul-2022 09:00	11-Jul-2022 10:00	----
						CG2209065-001	CG2209065-002	CG2209065-003	CG2209065-004	--------
						Result	Result	Result	Result	----
Total Metals										
sulfur, total	7704-34-9	E420	0.50	mg/L		36.9	9.73	<0.50	<0.50	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00170	0.00109	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	0.00058	<0.00050	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	0.0033	<0.0030	<0.0030	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0023	0.0034	<0.0010	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00013	<0.00010	<0.00010	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00011	0.00015	<0.00010	<0.00010	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0601	0.0349	<0.00010	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.0706	<0.0050	<0.0050	<0.0050	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		63.7	34.7	<0.050	<0.050	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		0.00016	0.00017	<0.00010	<0.00010	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0195	0.0026	<0.0010	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		26.4	7.93	<0.0050	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00121	<0.00010	<0.00010	<0.00010	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00128	0.000746	<0.000050	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00155	0.00078	<0.00050	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.11	0.235	<0.050	<0.050	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L		28.6	2.29	<0.050	<0.050	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.88	1.44	<0.050	<0.050	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_F023_WS_LAEMP_LCO_2022-07_N	RG_L124_WS_LAEMP_LCO_2022-07_N	RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	RG_TRIP_WS_LAEMP_LCO_2022-07_NP	----
					Client sampling date / time	11-Jul-2022 15:30	11-Jul-2022 11:10	11-Jul-2022 09:00	11-Jul-2022 10:00	----
						CG2209065-001	CG2209065-002	CG2209065-003	CG2209065-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		2.40	1.04	<0.050	<0.050	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.120	0.103	<0.00020	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		36.9	9.58	<0.50	<0.50	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00173	0.00109	<0.000010	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0022	0.0031	<0.0010	<0.0010	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2209065**	Page	: 1 of 22
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 12-Jul-2022 09:40
PO	: VPO00816101	Issue Date	: 20-Jul-2022 13:33
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS		
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Dissolved Metals	QC-MRG2-5631100 01	----	silicon, dissolved	7440-21-3	E421	0.052 B mg/L	0.05 mg/L	Blank result exceeds permitted value

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_F023_WS_LAEMP_LCO_2022-07_N	E298	11-Jul-2022	13-Jul-2022	----	----		13-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E298	11-Jul-2022	13-Jul-2022	----	----		13-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_L124_WS_LAEMP_LCO_2022-07_N	E298	11-Jul-2022	13-Jul-2022	----	----		13-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E298	11-Jul-2022	13-Jul-2022	----	----		13-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_F023_WS_LAEMP_LCO_2022-07_N	E235.Br-L	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E235.Br-L	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_L124_WS_LAEMP_LCO_2022-07_N	E235.Br-L	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E235.Br-L	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_F023_WS_LAEMP_LCO_2022-07_N	E235.Cl-L	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E235.Cl-L	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_L124_WS_LAEMP_LCO_2022-07_N	E235.Cl-L	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E235.Cl-L	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_F023_WS_LAEMP_LCO_2022-07_N	E378-U	11-Jul-2022	----	----	----		13-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E378-U	11-Jul-2022	----	----	----		13-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_L124_WS_LAEMP_LCO_2022-07_N	E378-U	11-Jul-2022	----	----	----		13-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E378-U	11-Jul-2022	----	----	----		13-Jul-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_F023_WS_LAEMP_LCO_2022-07_N	E235.F	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E235.F	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_L124_WS_LAEMP_LCO_2022-07_N	E235.F	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E235.F	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_F023_WS_LAEMP_LCO_2022-07_N	E235.NO3-L	11-Jul-2022	----	----	----		12-Jul-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_L124_WS_LAEMP_LCO_2022-07_N	E235.NO3-L	11-Jul-2022	----	----	----		12-Jul-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E235.NO3-L	11-Jul-2022	----	----	----		16-Jul-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E235.NO3-L	11-Jul-2022	----	----	----		16-Jul-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_F023_WS_LAEMP_LCO_2022-07_N	E235.NO2-L	11-Jul-2022	----	----	----		12-Jul-2022	3 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E235.NO2-L	11-Jul-2022	----	----	----		12-Jul-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_L124_WS_LAEMP_LCO_2022-07_N	E235.NO2-L	11-Jul-2022	----	----	----		12-Jul-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E235.NO2-L	11-Jul-2022	----	----	----		12-Jul-2022	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_F023_WS_LAEMP_LCO_2022-07_N	E235.SO4	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E235.SO4	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_L124_WS_LAEMP_LCO_2022-07_N	E235.SO4	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E235.SO4	11-Jul-2022	----	----	----		12-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_F023_WS_LAEMP_LCO_2022-07_N	E318	11-Jul-2022	17-Jul-2022	----	----		17-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E318	11-Jul-2022	17-Jul-2022	----	----		17-Jul-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_L124_WS_LAEMP_LCO_2022-07_N	E318	11-Jul-2022	17-Jul-2022	----	----		17-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E318	11-Jul-2022	17-Jul-2022	----	----		17-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_F023_WS_LAEMP_LCO_2022-07_N	E372-U	11-Jul-2022	15-Jul-2022	----	----		15-Jul-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E372-U	11-Jul-2022	15-Jul-2022	----	----		15-Jul-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_L124_WS_LAEMP_LCO_2022-07_N	E372-U	11-Jul-2022	15-Jul-2022	----	----		15-Jul-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E372-U	11-Jul-2022	15-Jul-2022	----	----		15-Jul-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_F023_WS_LAEMP_LCO_2022-07_N	E421.Cr-L	11-Jul-2022	16-Jul-2022	----	----		17-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E421.Cr-L	11-Jul-2022	16-Jul-2022	----	----		17-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_L124_WS_LAEMP_LCO_2022-07_N	E421.Cr-L	11-Jul-2022	16-Jul-2022	----	----		17-Jul-2022	180 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E421.Cr-L	11-Jul-2022	16-Jul-2022	----	----		17-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_F023_WS_LAEMP_LCO_2022-07_N	E509	11-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E509	11-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_L124_WS_LAEMP_LCO_2022-07_N	E509	11-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_F023_WS_LAEMP_LCO_2022-07_N	E421	11-Jul-2022	16-Jul-2022	----	----		17-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E421	11-Jul-2022	16-Jul-2022	----	----		17-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_L124_WS_LAEMP_LCO_2022-07_N	E421	11-Jul-2022	16-Jul-2022	----	----		17-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E421	11-Jul-2022	16-Jul-2022	----	----		17-Jul-2022	180 days	6 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_F023_WS_LAEMP_LCO_2022-07_N	E358-L	11-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E358-L	11-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_L124_WS_LAEMP_LCO_2022-07_N	E358-L	11-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_F023_WS_LAEMP_LCO_2022-07_N	E355-L	11-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E355-L	11-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_L124_WS_LAEMP_LCO_2022-07_N	E355-L	11-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E355-L	11-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	28 days	8 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_F023_WS_LAEMP_LCO_2022-07_N	E283	11-Jul-2022	----	----	----		13-Jul-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E283	11-Jul-2022	----	----	----		13-Jul-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_L124_WS_LAEMP_LCO_2022-07_N	E283	11-Jul-2022	----	----	----		13-Jul-2022	14 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Acidity by Titration										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E283	11-Jul-2022	----	----	----		13-Jul-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_F023_WS_LAEMP_LCO_2022-07_N	E290	11-Jul-2022	----	----	----		13-Jul-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E290	11-Jul-2022	----	----	----		13-Jul-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_L124_WS_LAEMP_LCO_2022-07_N	E290	11-Jul-2022	----	----	----		13-Jul-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E290	11-Jul-2022	----	----	----		13-Jul-2022	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_F023_WS_LAEMP_LCO_2022-07_N	E100	11-Jul-2022	----	----	----		13-Jul-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E100	11-Jul-2022	----	----	----		13-Jul-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_L124_WS_LAEMP_LCO_2022-07_N	E100	11-Jul-2022	----	----	----		13-Jul-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E100	11-Jul-2022	----	----	----		13-Jul-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : ORP by Electrode										
HDPE RG_F023_WS_LAEMP_LCO_2022-07_N	E125	11-Jul-2022	----	----	----		18-Jul-2022	0.25 hrs	165 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_L124_WS_LAEMP_LCO_2022-07_N	E125	11-Jul-2022	----	----	----		18-Jul-2022	0.25 hrs	170 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E125	11-Jul-2022	----	----	----		18-Jul-2022	0.25 hrs	171 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E125	11-Jul-2022	----	----	----		18-Jul-2022	0.25 hrs	172 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_F023_WS_LAEMP_LCO_2022-07_N	E108	11-Jul-2022	----	----	----		13-Jul-2022	0.25 hrs	44 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_L124_WS_LAEMP_LCO_2022-07_N	E108	11-Jul-2022	----	----	----		13-Jul-2022	0.25 hrs	48 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E108	11-Jul-2022	----	----	----		13-Jul-2022	0.25 hrs	50 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E108	11-Jul-2022	----	----	----		13-Jul-2022	0.25 hrs	51 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_F023_WS_LAEMP_LCO_2022-07_N	E162	11-Jul-2022	----	----	----		16-Jul-2022	7 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E162	11-Jul-2022	----	----	----		16-Jul-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_L124_WS_LAEMP_LCO_2022-07_N	E162	11-Jul-2022	----	----	----		16-Jul-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E162	11-Jul-2022	----	----	----		16-Jul-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_F023_WS_LAEMP_LCO_2022-07_N	E160-L	11-Jul-2022	----	----	----		16-Jul-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E160-L	11-Jul-2022	----	----	----		16-Jul-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_L124_WS_LAEMP_LCO_2022-07_N	E160-L	11-Jul-2022	----	----	----		16-Jul-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E160-L	11-Jul-2022	----	----	----		16-Jul-2022	7 days	5 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_F023_WS_LAEMP_LCO_2022-07_N	E121	11-Jul-2022	----	----	----		13-Jul-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E121	11-Jul-2022	----	----	----		13-Jul-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE RG_L124_WS_LAEMP_LCO_2022-07_N	E121	11-Jul-2022	----	----	----		13-Jul-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E121	11-Jul-2022	----	----	----		13-Jul-2022	3 days	2 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_F023_WS_LAEMP_LCO_2022-07_N	E420.Cr-L	11-Jul-2022	----	----	----		16-Jul-2022	180 days	5 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E420.Cr-L	11-Jul-2022	----	----	----		16-Jul-2022	180 days	5 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_L124_WS_LAEMP_LCO_2022-07_N	E420.Cr-L	11-Jul-2022	----	----	----		16-Jul-2022	180 days	5 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E420.Cr-L	11-Jul-2022	----	----	----		16-Jul-2022	180 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_F023_WS_LAEMP_LCO_2022-07_N	E508	11-Jul-2022	----	----	----		19-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E508	11-Jul-2022	----	----	----		19-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_L124_WS_LAEMP_LCO_2022-07_N	E508	11-Jul-2022	----	----	----		19-Jul-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_F023_WS_LAEMP_LCO_2022-07_N	E420	11-Jul-2022	----	----	----		16-Jul-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_FBLANK_WS_LAEMP_LCO_2022-07_NP	E420	11-Jul-2022	----	----	----		16-Jul-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_L124_WS_LAEMP_LCO_2022-07_N	E420	11-Jul-2022	----	----	----		16-Jul-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_TRIP_WS_LAEMP_LCO_2022-07_NP	E420	11-Jul-2022	----	----	----		16-Jul-2022	180 days	5 days	✓

Legend & Qualifier Definitions

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

EHT: Exceeded ALS recommended hold time prior to analysis.

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	560524	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	560520	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	560823	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	559713	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	559714	1	20	5.0	5.0	✓
Conductivity in Water	E100	560519	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	563110	1	12	8.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	567870	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	563111	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	566981	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	560879	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	559712	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	559715	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	559716	1	20	5.0	5.0	✓
ORP by Electrode	E125	563943	1	20	5.0	5.0	✓
pH by Meter	E108	560518	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	559717	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	563230	2	40	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	563023	1	4	25.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	565330	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	567642	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	563024	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	566982	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	562419	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	560402	2	40	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	560524	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	560520	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	560823	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	559713	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	559714	1	20	5.0	5.0	✓
Conductivity in Water	E100	560519	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	563110	1	12	8.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	567870	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	563111	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	566981	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	560879	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	559712	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	559715	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	559716	1	20	5.0	5.0	✓
ORP by Electrode	E125	563943	1	20	5.0	5.0	✓
pH by Meter	E108	560518	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	559717	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	563230	2	40	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	563023	1	4	25.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	565330	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	567642	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	563024	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	566982	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	562419	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	563225	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	560402	2	40	5.0	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	560524	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	560520	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	560823	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	559713	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	559714	1	20	5.0	5.0	✓
Conductivity in Water	E100	560519	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	563110	1	12	8.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	567870	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	563111	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	566981	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	560879	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	559712	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	559715	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	559716	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	559717	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	563230	2	40	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	563023	1	4	25.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	565330	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	567642	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	563024	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	566982	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	562419	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	563225	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	560402	2	40	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	560823	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	559713	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	559714	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	563110	1	12	8.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	567870	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	563111	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	566981	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	560879	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	559712	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	559715	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	559716	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	559717	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	563023	1	4	25.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	565330	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	567642	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	563024	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	566982	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	562419	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2209065**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 12-Jul-2022 09:40
PO	: VPO00816101	Date Analysis Commenced	: 12-Jul-2022
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS	Issue Date	: 20-Jul-2022 13:33
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anshim Anshim	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Parker Sgarbossa	Laboratory Analyst	Calgary Inorganics, Calgary, Alberta
Parnian Sane	Analyst	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Calgary Inorganics, Calgary, Alberta
Sara Niroomand		Calgary Inorganics, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 560402)											
CG2209046-003	Anonymous	turbidity	----	E121	0.10	NTU	138	152	9.11%	15%	----
Physical Tests (QC Lot: 560518)											
CG2209065-001	RG_F023_WS_LAEMP_LCO_2022-07_N	pH	----	E108	0.10	pH units	8.42	8.43	0.119%	4%	----
Physical Tests (QC Lot: 560519)											
CG2209065-001	RG_F023_WS_LAEMP_LCO_2022-07_N	conductivity	----	E100	2.0	µS/cm	491	492	0.203%	10%	----
Physical Tests (QC Lot: 560520)											
CG2209065-001	RG_F023_WS_LAEMP_LCO_2022-07_N	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	158	161	2.38%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	9.0	9.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	166	170	2.26%	20%	----
Physical Tests (QC Lot: 560524)											
CG2209065-001	RG_F023_WS_LAEMP_LCO_2022-07_N	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 561012)											
CG2208729-002	Anonymous	turbidity	----	E121	0.10	NTU	916	970	5.68%	15%	----
Physical Tests (QC Lot: 563230)											
CG2209046-008	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	662	636	3.93%	20%	----
Physical Tests (QC Lot: 563231)											
CG2209065-004	RG_TRIP_WS_LAEMP_LCO_2022-07_NP	solids, total dissolved [TDS]	----	E162	10	mg/L	<10	<10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 563943)											
CG2209047-004	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	421	417	0.954%	15%	----
Anions and Nutrients (QC Lot: 559712)											
CG2209025-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559713)											
CG2209025-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559714)											
CG2209025-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559715)											
CG2209025-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559716)											

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: 559716) - continued											
CG2209025-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 559717)											
CG2209025-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<0.30	<0.30	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 560823)											
CG2209057-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 560879)											
CG2209065-001	RG_F023_WS_LAEMP_LCO_2022-07_N	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 562419)											
CG2209047-013	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0114	0.0115	0.00006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 565330)											
CG2209028-003	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.500	mg/L	0.825	0.742	0.084	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 566981)											
CG2209057-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.69	0.61	0.08	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 566982)											
CG2209057-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.64	0.71	0.06	Diff <2x LOR	----
Total Metals (QC Lot: 563023)											
CG2209065-001	RG_F023_WS_LAEMP_LCO_2022-07_N	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00011	0.00012	0.000008	Diff <2x LOR	----
Total Metals (QC Lot: 563024)											
CG2209065-001	RG_F023_WS_LAEMP_LCO_2022-07_N	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0192	0.0162	0.0030	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00016	0.00016	0.000001	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00015	0.00018	0.00002	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0562	0.0564	0.250%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0678 µg/L	0.0000692	2.01%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	67.8	67.6	0.271%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.030	0.027	0.002	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0202	0.0203	0.642%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	27.8	28.0	0.858%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00396	0.00379	4.34%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 563024) - continued											
CG2209065-001	RG_F023_WS_LAEMP_LCO_2022-07_N	molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00130	0.00124	4.95%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00171	0.00176	0.00005	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.03	1.02	0.313%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	24.7 µg/L	0.0245	0.764%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.02	2.07	2.56%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	2.28	2.32	1.64%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.115	0.112	2.27%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	36.9	37.2	0.735%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00170	0.00164	3.56%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Total Metals (QC Lot: 567642)											
CG2209065-001	RG_F023_WS_LAEMP_LCO_2022-07_N	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 563110)											
CG2209057-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 563111)											
CG2209057-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0015	0.0014	0.0001	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00039	0.00039	0.000005	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00013	0.00012	0.000007	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0180	0.0186	3.29%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.018	0.018	0.0004	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	1.89 µg/L	0.00189	0.0313%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	176	178	1.26%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00171	0.00177	0.00006	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0243	0.0236	2.57%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 563111) - continued											
CG2209057-001	Anonymous	magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	110	112	1.56%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00082	0.00080	0.00002	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00130	0.00130	0.380%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.0294	0.0297	0.896%	20%	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.35	2.40	2.38%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	268 µg/L	0.265	1.24%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.62	2.58	1.45%	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	1.72	1.74	1.09%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.132	0.132	0.0232%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	214	205	4.24%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000025	0.000028	0.000003	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00881	0.00903	2.50%	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	0.0789	0.0812	2.78%	20%	----
Dissolved Metals (QC Lot: 567870)											
CG2209065-001	RG_F023_WS_LAEMP_LCO_2022-07_N	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: 560402)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 560519)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 560520)						
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: 560524)						
acidity (as CaCO3)	----	E283	2	mg/L	2.2	----
Physical Tests (QCLot: 561012)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 563225)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 563230)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 563231)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 559712)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 559713)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 559714)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 559715)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 559716)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 559717)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 560823)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 560879)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 560879) - continued						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 562419)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 565330)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 566981)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 566982)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 563023)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 563024)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 563024) - continued						
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
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	----
Total Metals (QCLot: 567642)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 563110)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 563111)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	# 0.052	B
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 563111) - continued						
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
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	----
Dissolved Metals (QCLot: 567870)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Qualifiers

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

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 560402)									
turbidity	----	E121	0.1	NTU	200 NTU	102	85.0	115	----
Physical Tests (QCLot: 560518)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 560519)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	93.9	90.0	110	----
Physical Tests (QCLot: 560520)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	105	85.0	115	----
Physical Tests (QCLot: 560524)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	103	85.0	115	----
Physical Tests (QCLot: 561012)									
turbidity	----	E121	0.1	NTU	200 NTU	102	85.0	115	----
Physical Tests (QCLot: 563225)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	90.4	85.0	115	----
Physical Tests (QCLot: 563230)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	90.6	85.0	115	----
Physical Tests (QCLot: 563231)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	94.0	85.0	115	----
Physical Tests (QCLot: 563943)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	99.0	95.4	104	----
Anions and Nutrients (QCLot: 559712)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 559713)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	99.2	85.0	115	----
Anions and Nutrients (QCLot: 559714)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 559715)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 559716)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 559717)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	109	90.0	110	----
Anions and Nutrients (QCLot: 560823)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 560823) - continued									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	96.0	85.0	115	----
Anions and Nutrients (QCLot: 560879)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	98.6	80.0	120	----
Anions and Nutrients (QCLot: 562419)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	92.8	80.0	120	----
Anions and Nutrients (QCLot: 565330)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	101	75.0	125	----
Organic / Inorganic Carbon (QCLot: 566981)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	95.6	80.0	120	----
Organic / Inorganic Carbon (QCLot: 566982)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	99.3	80.0	120	----
Total Metals (QCLot: 563023)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	95.6	80.0	120	----
Total Metals (QCLot: 563024)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	96.1	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	97.0	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	86.6	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	98.0	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	99.3	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	95.1	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	94.1	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	99.3	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	103	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	96.1	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	96.9	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.8	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	96.8	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	99.0	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	110	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 563024) - continued									
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.0	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	93.2	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	85.0	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	102	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	100	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	92.5	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	97.2	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	97.0	80.0	120	----
Total Metals (QCLot: 567642)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	94.1	80.0	120	----
Dissolved Metals (QCLot: 563110)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Dissolved Metals (QCLot: 563111)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	106	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	106	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	95.7	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	99.6	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	90.9	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.3	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	107	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	96.5	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	97.8	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	105	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	108	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	110	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	109	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 563111) - continued									
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	100	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	105	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	99.3	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	103	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	104	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	100	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	108	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	95.9	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 559712)										
CG2209065-004	RG_TRIP_WS_LAEMP_LCO_2022-07_NP	fluoride	16984-48-8	E235.F	0.933 mg/L	1 mg/L	93.3	75.0	125	----
Anions and Nutrients (QCLot: 559713)										
CG2209065-004	RG_TRIP_WS_LAEMP_LCO_2022-07_NP	bromide	24959-67-9	E235.Br-L	0.515 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 559714)										
CG2209065-004	RG_TRIP_WS_LAEMP_LCO_2022-07_NP	chloride	16887-00-6	E235.Cl-L	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 559715)										
CG2209065-004	RG_TRIP_WS_LAEMP_LCO_2022-07_NP	nitrate (as N)	14797-55-8	E235.NO3-L	2.61 mg/L	2.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 559716)										
CG2209065-004	RG_TRIP_WS_LAEMP_LCO_2022-07_NP	nitrite (as N)	14797-65-0	E235.NO2-L	0.532 mg/L	0.5 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 559717)										
CG2209065-004	RG_TRIP_WS_LAEMP_LCO_2022-07_NP	sulfate (as SO4)	14808-79-8	E235.SO4	111 mg/L	100 mg/L	111	75.0	125	----
Anions and Nutrients (QCLot: 560823)										
CG2209057-004	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0990 mg/L	0.1 mg/L	99.0	75.0	125	----
Anions and Nutrients (QCLot: 560879)										
CG2209065-002	RG_L124_WS_LAEMP_LCO_2022-07_N	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0475 mg/L	0.05 mg/L	95.0	70.0	130	----
Anions and Nutrients (QCLot: 562419)										
CG2209052-001	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.0676 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 565330)										
CG2209057-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.44 mg/L	2.5 mg/L	97.7	70.0	130	----
Organic / Inorganic Carbon (QCLot: 566981)										
CG2209057-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	4.79 mg/L	5 mg/L	95.8	70.0	130	----
Organic / Inorganic Carbon (QCLot: 566982)										
CG2209057-001	Anonymous	carbon, total organic [TOC]	----	E355-L	4.85 mg/L	5 mg/L	97.0	70.0	130	----
Total Metals (QCLot: 563023)										
CG2209065-002	RG_L124_WS_LAEMP_LCO_2022-07_N	chromium, total	7440-47-3	E420.Cr-L	0.0378 mg/L	0.04 mg/L	94.5	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 563024)										
CG2209065-002	RG_L124_WS_LAEMP_LCO_2022-07_N	aluminum, total	7429-90-5	E420	0.188 mg/L	0.2 mg/L	94.3	70.0	130	----
		antimony, total	7440-36-0	E420	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0189 mg/L	0.02 mg/L	94.7	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00956 mg/L	0.01 mg/L	95.6	70.0	130	----
		boron, total	7440-42-8	E420	0.082 mg/L	0.1 mg/L	81.8	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00382 mg/L	0.004 mg/L	95.5	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		copper, total	7440-50-8	E420	0.0187 mg/L	0.02 mg/L	93.4	70.0	130	----
		iron, total	7439-89-6	E420	1.95 mg/L	2 mg/L	97.6	70.0	130	----
		lead, total	7439-92-1	E420	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		lithium, total	7439-93-2	E420	0.0994 mg/L	0.1 mg/L	99.4	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0191 mg/L	0.02 mg/L	95.6	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0198 mg/L	0.02 mg/L	99.3	70.0	130	----
		nickel, total	7440-02-0	E420	0.0380 mg/L	0.04 mg/L	94.9	70.0	130	----
		potassium, total	7440-09-7	E420	3.88 mg/L	4 mg/L	97.0	70.0	130	----
		selenium, total	7782-49-2	E420	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
		silicon, total	7440-21-3	E420	9.22 mg/L	10 mg/L	92.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00395 mg/L	0.004 mg/L	98.6	70.0	130	----
		sodium, total	7440-23-5	E420	1.97 mg/L	2 mg/L	98.4	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	19.0 mg/L	20 mg/L	94.9	70.0	130	----
		thallium, total	7440-28-0	E420	0.00379 mg/L	0.004 mg/L	94.8	70.0	130	----
		tin, total	7440-31-5	E420	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		titanium, total	7440-32-6	E420	0.0378 mg/L	0.04 mg/L	94.4	70.0	130	----
		uranium, total	7440-61-1	E420	0.00392 mg/L	0.004 mg/L	97.9	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0957 mg/L	0.1 mg/L	95.7	70.0	130	----
		zinc, total	7440-66-6	E420	0.380 mg/L	0.4 mg/L	95.0	70.0	130	----
Total Metals (QCLot: 567642)										
CG2209065-002	RG_L124_WS_LAEMP_LCO_2022-07_N	mercury, total	7439-97-6	E508	0.0000946 mg/L	0.0001 mg/L	94.6	70.0	130	----
Dissolved Metals (QCLot: 563110)										
CG2209057-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0392 mg/L	0.04 mg/L	98.0	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 563111)										
CG2209057-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.203 mg/L	0.2 mg/L	101	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0372 mg/L	0.04 mg/L	92.9	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00889 mg/L	0.01 mg/L	88.9	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.089 mg/L	0.1 mg/L	89.3	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00391 mg/L	0.004 mg/L	97.7	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.93 mg/L	2 mg/L	96.7	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0917 mg/L	0.1 mg/L	91.7	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0205 mg/L	0.02 mg/L	103	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0381 mg/L	0.04 mg/L	95.3	70.0	130	----
		potassium, dissolved	7440-09-7	E421	4.10 mg/L	4 mg/L	103	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0440 mg/L	0.04 mg/L	110	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.32 mg/L	10 mg/L	93.2	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00396 mg/L	0.004 mg/L	99.0	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00386 mg/L	0.004 mg/L	96.5	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00392 mg/L	0.004 mg/L	98.1	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.395 mg/L	0.4 mg/L	98.8	70.0	130	----
Dissolved Metals (QCLot: 567870)										
CG2209065-002	RG_L124_WS_LAEMP_LCO_2022-07_N	mercury, dissolved	7439-97-6	E509	0.0000908 mg/L	0.0001 mg/L	90.8	70.0	130	----

Teck

Environmental Division Calgary
Work Order Reference
CG2209065

COC ID: REP_LAEMP_LCO_2022_JULY_ALS | TURNAROUND TIME: Regular | RUSH: N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1:	aquascilab@teck.com	X	X	X
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								Email 4:	Jessica.Ritz@Teck.com	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Tyler.Mehler@Minnow.ca	X	X	X
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Phone Number	250-910-8755			Phone Number	403 407 1794			PO number	VPO00816101			

Environmental Division Calgary
Work Order Reference
CG2209065

Telephone : +1 403 407 1800

SAMPLE DETAILS / ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Filt.	F	N	F	N	F	N	N					
								PRESERV.	H2SO4	H2SO4	HCL	NONE	HNO3	HNO3	NONE					
								ANALYSIS	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	HG-T-U-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-METNHG-T-CL	TECKCOAL-ROUTINE-VA					
RG_F023_WS_LAEMP_LCO_2022-07-N	RG_F023	WS	NO	2022-07-11	15:30	G	7		X	X	X	X	X	X	X					
RG_L124_WS_LAEMP_LCO_2022-07-N	RG_L124	WS	NO	2022-07-11	11:10	G	7		X	X	X	X	X	X	X					
RG_FBLANK_WS_LAEMP_LCO_2022-07-NP	RG_FBLANK	WS	NO	2022-07-11	09:00	G	7		X	X	X	X	X	X	X					
RG_TRIP_WS_LAEMP_LCO_2022-07-NP	RG_TRIP	WS	NO	2022-07-11	10:00	G	4			X		X	X		X					
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Rick Smit / Teck Environmental	2022-07-11 17:00		

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge		Sampler's Signature		Date/Time	2022-07-11 / 17:00
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

WATER CHEMISTRY

ALS Laboratory Report CG2209232
(Finalized July 21, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2209232**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 14-Jul-2022 10:05
PO	: VPO00816101	Date Analysis Commenced	: 14-Jul-2022
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS	Issue Date	: 21-Jul-2022 18:13
Sampler	: Tristin Vandemeulen		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kyle Chang	Lab Assistant	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Sofiya Ivanova	Lab Assistant	Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LISP24_WS_LAEMP_LCO_2022-07_N	RG_FRUL_WS_LAEMP_LCO_2022-07_N	----	----	----
					Client sampling date / time	13-Jul-2022 12:45	13-Jul-2022 09:30	----	----	----
						CG2209232-001	CG2209232-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	<2.0	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		189	185	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		230	226	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		189	185	----	----	----
conductivity	----	E100	2.0	µS/cm		577	539	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		290	276	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV		379	372	----	----	----
pH	----	E108	0.10	pH units		7.67	7.79	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		404	358	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		1.9	5.7	----	----	----
turbidity	----	E121	0.10	NTU		0.18	1.36	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		3.92	1.50	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.237	0.197	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		1.05	1.49	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		5.62	6.44	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0034	0.0044	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0021	0.0054	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		132	109	----	----	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		0.78	1.18	----	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		0.71	1.06	----	----	----
Ion Balance										

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LISP24_WS_LAEMP_LCO_2022-07_N	RG_FRUL_WS_LAEMP_LCO_2022-07_N	----	----	----
					Client sampling date / time	13-Jul-2022 12:45	13-Jul-2022 09:30	----	----	----
						CG2209232-001	CG2209232-002	--------	--------	--------
						Result	Result	----	----	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		7.05	6.48	----	----	----
cation sum	----	EC101	0.10	meq/L		6.02	5.63	----	----	----
ion balance (cations/anions)	----	EC101	0.010	%		85.4	86.9	----	----	----
ion balance (APHA)	----	EC101	0.010	%		7.88	7.02	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0033	0.0102	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00021	0.00013	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00012	0.00013	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0321	0.0662	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L		<0.020	<0.020	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.010	0.013	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L		0.358	0.0251	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		74.4	65.2	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00017	0.00014	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L		<0.10	<0.10	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.010	0.019	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0262	0.0177	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		31.8	29.1	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00152	0.00296	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00133	0.00115	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00653	0.00113	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		1.11	1.06	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L		28.0	27.8	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		1.96	1.82	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		4.44	1.89	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.144	0.111	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LISP24_WS_LAEMP_LCO_2022-07_N	RG_FRUL_WS_LAEMP_LCO_2022-07_N	----	----	----
					Client sampling date / time	13-Jul-2022 12:45	13-Jul-2022 09:30	----	----	----
						CG2209232-001	CG2209232-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
sulfur, total	7704-34-9	E420	0.50	mg/L		47.6	40.9	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	0.00032	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00236	0.00165	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0150	<0.0030	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0020	0.0013	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00022	0.00012	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00010	<0.00010	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0326	0.0658	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	<0.020	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.010	<0.010	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.330	0.0184	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		69.5	66.2	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		0.00013	0.00014	----	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L		<0.10	<0.10	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00037	<0.00020	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	<0.010	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0293	0.0194	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		28.4	26.9	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00125	0.00100	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00144	0.00125	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00623	0.00095	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.13	1.11	----	----	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L		27.7	28.7	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.89	1.73	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LISP24_WS_LAEMP_LCO_2022-07_N	RG_FRUL_WS_LAEMP_LCO_2022-07_N	----	----	----
					Client sampling date / time	13-Jul-2022 12:45	13-Jul-2022 09:30	----	----	----
						CG2209232-001	CG2209232-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		4.23	1.90	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.144	0.106	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		46.8	37.8	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		0.000010	<0.000010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00231	0.00160	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0136	<0.0010	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2209232**	Page	: 1 of 16
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 14-Jul-2022 10:05
PO	: VPO00816101	Issue Date	: 21-Jul-2022 18:13
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS		
Sampler	: Tristin Vandemeulen		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E298	13-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E298	13-Jul-2022	14-Jul-2022	----	----		14-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E235.Br-L	13-Jul-2022	----	----	----		15-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E235.Br-L	13-Jul-2022	----	----	----		15-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E235.Cl-L	13-Jul-2022	----	----	----		15-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E235.Cl-L	13-Jul-2022	----	----	----		15-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E378-U	13-Jul-2022	----	----	----		15-Jul-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-07_N	E378-U	13-Jul-2022	----	----	----		15-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-07_N	E235.F	13-Jul-2022	----	----	----		15-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-07_N	E235.F	13-Jul-2022	----	----	----		15-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-07_N	E235.NO3-L	13-Jul-2022	----	----	----		15-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-07_N	E235.NO3-L	13-Jul-2022	----	----	----		15-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-07_N	E235.NO2-L	13-Jul-2022	----	----	----		15-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-07_N	E235.NO2-L	13-Jul-2022	----	----	----		15-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-07_N	E235.SO4	13-Jul-2022	----	----	----		15-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-07_N	E235.SO4	13-Jul-2022	----	----	----		15-Jul-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E318	13-Jul-2022	20-Jul-2022	----	----		20-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E318	13-Jul-2022	20-Jul-2022	----	----		20-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E372-U	13-Jul-2022	18-Jul-2022	----	----		20-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E372-U	13-Jul-2022	18-Jul-2022	----	----		20-Jul-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E421.Cr-L	13-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E421.Cr-L	13-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E509	13-Jul-2022	21-Jul-2022	----	----		21-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E509	13-Jul-2022	21-Jul-2022	----	----		21-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E421	13-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	180 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E421	13-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	180 days	6 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E358-L	13-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E358-L	13-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E355-L	13-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E355-L	13-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	8 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E283	13-Jul-2022	----	----	----		14-Jul-2022	14 days	1 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E283	13-Jul-2022	----	----	----		14-Jul-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E290	13-Jul-2022	----	----	----		14-Jul-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E290	13-Jul-2022	----	----	----		14-Jul-2022	14 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-07_N	E100	13-Jul-2022	----	----	----		14-Jul-2022	28 days	1 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-07_N	E100	13-Jul-2022	----	----	----		14-Jul-2022	28 days	1 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-07_N	E125	13-Jul-2022	----	----	----		21-Jul-2022	0.25 hrs	194 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-07_N	E125	13-Jul-2022	----	----	----		21-Jul-2022	0.25 hrs	197 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-07_N	E108	13-Jul-2022	----	----	----		14-Jul-2022	0.25 hrs	28 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-07_N	E108	13-Jul-2022	----	----	----		14-Jul-2022	0.25 hrs	31 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-07_N	E162	13-Jul-2022	----	----	----		19-Jul-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-07_N	E162	13-Jul-2022	----	----	----		19-Jul-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-07_N	E160-L	13-Jul-2022	----	----	----		18-Jul-2022	7 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E160-L	13-Jul-2022	----	----	----		18-Jul-2022	7 days	5 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E121	13-Jul-2022	----	----	----		15-Jul-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E121	13-Jul-2022	----	----	----		15-Jul-2022	3 days	2 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E420.Cr-L	13-Jul-2022	----	----	----		20-Jul-2022	180 days	7 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E420.Cr-L	13-Jul-2022	----	----	----		20-Jul-2022	180 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E508	13-Jul-2022	----	----	----		21-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E508	13-Jul-2022	----	----	----		21-Jul-2022	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-07_N	E420	13-Jul-2022	----	----	----		20-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-07_N	E420	13-Jul-2022	----	----	----		20-Jul-2022	180 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	563141	1	16	6.2	5.0	✓
Alkalinity Species by Titration	E290	563124	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	563059	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	564054	1	17	5.8	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	564055	1	17	5.8	5.0	✓
Conductivity in Water	E100	563122	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	567151	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	570989	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	567150	1	16	6.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	568988	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	564549	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	564053	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	564051	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	564052	1	19	5.2	5.0	✓
ORP by Electrode	E125	566710	1	20	5.0	5.0	✓
pH by Meter	E108	563123	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	564056	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	566570	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	567891	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	568586	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	570996	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	567890	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	568989	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	566882	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	563914	2	40	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	563141	1	16	6.2	5.0	✓
Alkalinity Species by Titration	E290	563124	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	563059	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	564054	1	17	5.8	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	564055	1	17	5.8	5.0	✓
Conductivity in Water	E100	563122	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	567151	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	570989	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	567150	1	16	6.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	568988	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	564549	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	564053	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	564051	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	564052	1	19	5.2	5.0	✓
ORP by Electrode	E125	566710	1	20	5.0	5.0	✓
pH by Meter	E108	563123	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	564056	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	566570	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	567891	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	568586	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	570996	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	567890	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	568989	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	566882	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	566556	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	563914	2	40	5.0	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	563141	1	16	6.2	5.0	✓
Alkalinity Species by Titration	E290	563124	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	563059	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	564054	1	17	5.8	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	564055	1	17	5.8	5.0	✓
Conductivity in Water	E100	563122	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	567151	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	570989	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	567150	1	16	6.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	568988	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	564549	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	564053	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	564051	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	564052	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	564056	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	566570	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	567891	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	568586	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	570996	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	567890	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	568989	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	566882	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	566556	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	563914	2	40	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	563059	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	564054	1	17	5.8	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	564055	1	17	5.8	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	567151	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	570989	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	567150	1	16	6.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	568988	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	564549	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	564053	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	564051	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	564052	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	564056	1	17	5.8	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	567891	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	568586	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	570996	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	567890	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	568989	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	566882	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2209232**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 14-Jul-2022 10:05
PO	: VPO00816101	Date Analysis Commenced	: 14-Jul-2022
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS	Issue Date	: 21-Jul-2022 18:13
Sampler	: Tristin Vandemeulen		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
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Kyle Chang	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
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Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Sofiya Ivanova	Lab Assistant	Calgary Inorganics, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 563122)											
CG2209230-001	Anonymous	conductivity	----	E100	2.0	µS/cm	231	226	2.19%	10%	----
Physical Tests (QC Lot: 563123)											
CG2209230-001	Anonymous	pH	----	E108	0.10	pH units	7.17	7.27	1.38%	4%	----
Physical Tests (QC Lot: 563124)											
CG2209230-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	126	123	2.17%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	126	123	2.17%	20%	----
Physical Tests (QC Lot: 563141)											
CG2209221-001	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	2.2	2.3	0.02	Diff <2x LOR	----
Physical Tests (QC Lot: 563914)											
CG2209209-017	Anonymous	turbidity	----	E121	0.10	NTU	7.74	7.60	1.80%	15%	----
Physical Tests (QC Lot: 564227)											
CG2209219-001	Anonymous	turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 566570)											
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	solids, total dissolved [TDS]	----	E162	20	mg/L	404	404	0.124%	20%	----
Physical Tests (QC Lot: 566710)											
CG2209221-004	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	309	304	1.53%	15%	----
Anions and Nutrients (QC Lot: 563059)											
CG2209220-009	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0523	0.0511	2.32%	20%	----
Anions and Nutrients (QC Lot: 564051)											
CG2209197-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.0680	0.0800	0.0120	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 564052)											
CG2209197-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 564053)											
CG2209197-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.114	0.117	0.003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 564054)											
CG2209197-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 564055)											
CG2209197-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.50	mg/L	3.74	3.52	0.22	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 564056)											

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: 564056) - continued											
CG2209197-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	463	460	0.553%	20%	----
Anions and Nutrients (QC Lot: 564549)											
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 566882)											
CG2209221-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 568586)											
CG2209220-016	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.063	0.075	0.012	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 568988)											
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.78	0.77	0.02	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 568989)											
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.71	0.70	0.02	Diff <2x LOR	----
Total Metals (QC Lot: 567890)											
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0033	0.0035	0.0002	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00021	0.00022	0.000008	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00012	0.00013	0.00001	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0321	0.0323	0.589%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.010	<0.010	0.0003	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.358 µg/L	0.000354	1.24%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	74.4	71.0	4.63%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0262	0.0251	4.43%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	31.8	32.0	0.758%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00152	0.00161	5.58%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00133	0.00141	6.04%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00653	0.00653	0.0941%	20%	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.11	1.12	0.320%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	28.0 µg/L	0.0283	1.18%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.96	1.92	2.20%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 567890) - continued											
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	4.44	4.41	0.787%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.144	0.147	2.25%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	47.6	47.1	1.07%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00236	0.00246	4.45%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0150	0.0154	0.0004	Diff <2x LOR	----
Total Metals (QC Lot: 567891)											
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00017	0.00014	0.00003	Diff <2x LOR	----
Total Metals (QC Lot: 570996)											
CG2209220-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 567150)											
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0020	0.0015	0.0005	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00022	0.00022	0.000001	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00010	0.00011	0.000003	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0326	0.0324	0.571%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.010	0.010	0.0001	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.330 µg/L	0.000335	1.40%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	69.5	69.4	0.0354%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00037	0.00035	0.00001	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0293	0.0291	0.812%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	28.4	29.3	2.96%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00125	0.00119	4.73%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00144	0.00146	1.91%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00623	0.00628	0.880%	20%	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.13	1.14	0.965%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 567150) - continued											
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	selenium, dissolved	7782-49-2	E421	0.000050	mg/L	27.7 µg/L	0.0294	6.05%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.89	1.91	1.02%	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	4.23	4.23	0.0590%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.144	0.150	3.82%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	46.8	46.3	0.982%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000010	0.000010	0.0000003	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00231	0.00234	1.41%	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	0.0136	0.0137	0.838%	20%	----
Dissolved Metals (QC Lot: 567151)											
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00013	0.00013	0.000002	Diff <2x LOR	----
Dissolved Metals (QC Lot: 570989)											
CG2209220-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 563122)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 563124)						
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: 563141)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 563914)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 564227)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 566556)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 566570)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 563059)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 564051)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 564052)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 564053)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 564054)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 564055)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 564056)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 564549)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 566882)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 566882) - continued						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 568586)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 568988)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 568989)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 567890)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 567890) - continued						
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	----
Total Metals (QCLot: 567891)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 570996)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 567150)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 567150) - continued						
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	----
Dissolved Metals (QCLot: 567151)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 570989)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 563122)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	101	90.0	110	----
Physical Tests (QCLot: 563123)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 563124)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	109	85.0	115	----
Physical Tests (QCLot: 563141)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	101	85.0	115	----
Physical Tests (QCLot: 563914)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 564227)									
turbidity	----	E121	0.1	NTU	200 NTU	99.2	85.0	115	----
Physical Tests (QCLot: 566556)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	95.6	85.0	115	----
Physical Tests (QCLot: 566570)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	90.2	85.0	115	----
Physical Tests (QCLot: 566710)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	99.5	95.4	104	----
Anions and Nutrients (QCLot: 563059)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.6	85.0	115	----
Anions and Nutrients (QCLot: 564051)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 564052)									
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: 564053)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 564054)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	105	85.0	115	----
Anions and Nutrients (QCLot: 564055)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 564056)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 564549)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 564549) - continued									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 566882)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	104	80.0	120	----
Anions and Nutrients (QCLot: 568586)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	98.0	75.0	125	----
Organic / Inorganic Carbon (QCLot: 568988)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	90.0	80.0	120	----
Organic / Inorganic Carbon (QCLot: 568989)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	93.9	80.0	120	----
Total Metals (QCLot: 567890)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	103	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	107	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.1	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	97.7	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	97.0	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	106	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	97.1	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	106	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.7	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	92.4	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	103	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	99.2	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.0	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	106	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	88.2	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	98.8	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	97.8	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 567890) - continued									
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	99.3	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.0	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	104	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	106	80.0	120	----
Total Metals (QCLot: 567891)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Total Metals (QCLot: 570996)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	98.3	80.0	120	----
Dissolved Metals (QCLot: 567150)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	103	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	106	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	99.5	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	97.9	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	92.1	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	94.2	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.3	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.2	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.0	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.3	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	103	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.8	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	96.9	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	97.8	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.1	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.6	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	99.2	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	97.4	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 567150) - continued									
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	97.7	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.7	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	95.4	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	95.7	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.7	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	99.7	80.0	120	----
Dissolved Metals (QCLot: 567151)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	96.5	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	97.2	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 563059)										
CG2209220-010	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0974 mg/L	0.1 mg/L	97.4	75.0	125	----
Anions and Nutrients (QCLot: 564051)										
CG2209197-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.15 mg/L	2.5 mg/L	86.2	75.0	125	----
Anions and Nutrients (QCLot: 564052)										
CG2209197-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.441 mg/L	0.5 mg/L	88.2	75.0	125	----
Anions and Nutrients (QCLot: 564053)										
CG2209197-002	Anonymous	fluoride	16984-48-8	E235.F	0.899 mg/L	1 mg/L	89.9	75.0	125	----
Anions and Nutrients (QCLot: 564054)										
CG2209197-002	Anonymous	bromide	24959-67-9	E235.Br-L	0.468 mg/L	0.5 mg/L	93.6	75.0	125	----
Anions and Nutrients (QCLot: 564055)										
CG2209197-002	Anonymous	chloride	16887-00-6	E235.Cl-L	86.6 mg/L	100 mg/L	86.6	75.0	125	----
Anions and Nutrients (QCLot: 564056)										
CG2209197-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	86.8 mg/L	100 mg/L	86.8	75.0	125	----
Anions and Nutrients (QCLot: 564549)										
CG2209232-002	RG_FRUL_WS_LAEMP_LCO_2022-07_N	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0483 mg/L	0.05 mg/L	96.6	70.0	130	----
Anions and Nutrients (QCLot: 566882)										
CG2209221-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0550 mg/L	0.0676 mg/L	81.3	70.0	130	----
Anions and Nutrients (QCLot: 568586)										
CG2209220-017	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.51 mg/L	2.5 mg/L	100	70.0	130	----
Organic / Inorganic Carbon (QCLot: 568988)										
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	carbon, dissolved organic [DOC]	----	E358-L	4.88 mg/L	5 mg/L	97.6	70.0	130	----
Organic / Inorganic Carbon (QCLot: 568989)										
CG2209232-001	RG_LISP24_WS_LAEMP_LCO_2022-07_N	carbon, total organic [TOC]	----	E355-L	5.09 mg/L	5 mg/L	102	70.0	130	----
Total Metals (QCLot: 567890)										
CG2209232-002	RG_FRUL_WS_LAEMP_LCO_2022-07_N	aluminum, total	7429-90-5	E420	0.198 mg/L	0.2 mg/L	99.3	70.0	130	----
		antimony, total	7440-36-0	E420	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0200 mg/L	0.02 mg/L	100.0	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 567890) - continued										
CG2209232-002	RG_FRUL_WS_LAEMP_LCO_2022-07_N	barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0383 mg/L	0.04 mg/L	95.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00978 mg/L	0.01 mg/L	97.8	70.0	130	----
		boron, total	7440-42-8	E420	0.090 mg/L	0.1 mg/L	90.3	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00400 mg/L	0.004 mg/L	100.0	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		copper, total	7440-50-8	E420	0.0184 mg/L	0.02 mg/L	92.2	70.0	130	----
		iron, total	7439-89-6	E420	1.96 mg/L	2 mg/L	97.8	70.0	130	----
		lead, total	7439-92-1	E420	0.0187 mg/L	0.02 mg/L	93.6	70.0	130	----
		lithium, total	7439-93-2	E420	0.0926 mg/L	0.1 mg/L	92.6	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0185 mg/L	0.02 mg/L	92.5	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		nickel, total	7440-02-0	E420	0.0372 mg/L	0.04 mg/L	92.9	70.0	130	----
		potassium, total	7440-09-7	E420	3.82 mg/L	4 mg/L	95.5	70.0	130	----
		selenium, total	7782-49-2	E420	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		silicon, total	7440-21-3	E420	9.24 mg/L	10 mg/L	92.4	70.0	130	----
		silver, total	7440-22-4	E420	0.00378 mg/L	0.004 mg/L	94.6	70.0	130	----
		sodium, total	7440-23-5	E420	1.96 mg/L	2 mg/L	98.3	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00371 mg/L	0.004 mg/L	92.8	70.0	130	----
		tin, total	7440-31-5	E420	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		titanium, total	7440-32-6	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		uranium, total	7440-61-1	E420	0.00407 mg/L	0.004 mg/L	102	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0999 mg/L	0.1 mg/L	99.9	70.0	130	----
		zinc, total	7440-66-6	E420	0.388 mg/L	0.4 mg/L	97.0	70.0	130	----
Total Metals (QCLot: 567891)										
CG2209232-002	RG_FRUL_WS_LAEMP_LCO_2022-07_N	chromium, total	7440-47-3	E420.Cr-L	0.0392 mg/L	0.04 mg/L	98.1	70.0	130	----
Total Metals (QCLot: 570996)										
CG2209220-002	Anonymous	mercury, total	7439-97-6	E508	0.0000939 mg/L	0.0001 mg/L	93.9	70.0	130	----
Dissolved Metals (QCLot: 567150)										
CG2209232-002	RG_FRUL_WS_LAEMP_LCO_2022-07_N	aluminum, dissolved	7429-90-5	E421	0.186 mg/L	0.2 mg/L	93.1	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0205 mg/L	0.02 mg/L	103	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: 567150) - continued										
CG2209232-002	RG_FRUL_WS_LAEMP_LCO_2022-07_N	arsenic, dissolved	7440-38-2	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0388 mg/L	0.04 mg/L	97.1	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00820 mg/L	0.01 mg/L	82.0	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.096 mg/L	0.1 mg/L	96.4	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00397 mg/L	0.004 mg/L	99.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0183 mg/L	0.02 mg/L	91.5	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0184 mg/L	0.02 mg/L	92.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.85 mg/L	2 mg/L	92.7	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0188 mg/L	0.02 mg/L	93.8	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0971 mg/L	0.1 mg/L	97.1	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0185 mg/L	0.02 mg/L	92.7	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0354 mg/L	0.04 mg/L	88.4	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.64 mg/L	4 mg/L	90.9	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0376 mg/L	0.04 mg/L	94.0	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.27 mg/L	10 mg/L	92.7	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00388 mg/L	0.004 mg/L	96.9	70.0	130	----
		sodium, dissolved	7440-23-5	E421	1.79 mg/L	2 mg/L	89.3	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00359 mg/L	0.004 mg/L	89.7	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0390 mg/L	0.04 mg/L	97.4	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00373 mg/L	0.004 mg/L	93.4	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0962 mg/L	0.1 mg/L	96.2	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.369 mg/L	0.4 mg/L	92.4	70.0	130	----
Dissolved Metals (QCLot: 567151)										
CG2209232-002	RG_FRUL_WS_LAEMP_LCO_2022-07_N	chromium, dissolved	7440-47-3	E421.Cr-L	0.0380 mg/L	0.04 mg/L	95.0	70.0	130	----
Dissolved Metals (QCLot: 570989)										
CG2209220-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000987 mg/L	0.0001 mg/L	98.7	70.0	130	----

Teck

COC ID: REP_LAEMP_LCO_2022_JULY_ALS | TURNAROUND TIME: Regular | RUSH: N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	ALS Calgary			Report Format / Distribution	Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1: aquascilab@teck.com	X	X	X
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								Email 4: Jessica.Ritz@Teck.com	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5: Tyler.Mehler@Minnow.ca	X	X	X
	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6: lbowron@minnow.ca	X	X	X
	50-910-8755			Phone Number	403 407 1794			PO number	VPO00816101		

Environmental Division
Calgary
Work Order Reference
CG2209232

Telephone : +1 403 407 1800

SAMPLE DETAILS | ANALYSIS REQUESTED

Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Fil.	F	N	F	N	F	N	N
								PRESERV.	H2SO4	H2SO4	HCL	NONE	HNO3	HNO3	NONE
								ANALYSIS	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	HG-T-U-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-METNHG-T-CL	TECKCOAL-ROUTINE-VA
RG_LISP24_WS_LAEMP_LCO_2022-07_N	RG_LISP24	WS	NO	2022-07-13	12:45	G	7		X	X	X	X	X	X	X
RG_FRUL_WS_LAEMP_LCO_2022-07_N	RG_FRUL	WS	NO	2022-07-13	09:30	G	7		X	X	X	X	X	X	X
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									
		WS	NO			G									

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Rick Smit/Lotic Environment	2022-07-13 15:14		7/14/22

SERVICE REQUEST (rush - subject to availability)				
Regular (default) X	Sampler's Name	Tristin Vandermeulen	Mobile #	250-569-7209
Priority (2-3 business days) - 50% surcharge				
Emergency (1 Business Day) - 100% surcharge	Sampler's Signature		Date/Time	2022-07-13 @ 15:19
For Emergency <1 Day, ASAP or Weekend - Contact ALS				

WATER CHEMISTRY

ALS Laboratory Report CG2209323

(Finalized July 25, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2209323**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 15-Jul-2022 10:30
PO	: VPO00816101	Date Analysis Commenced	: 16-Jul-2022
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS	Issue Date	: 25-Jul-2022 16:50
Sampler	: Tristin Vandemeulen		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Erin Sanchez		Metals, Burnaby, British Columbia
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Maria Tuguinay	Lab Assistant	Inorganics, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Woochan Song	Lab Analyst	Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	RG_LI8_WS_LAEMP_LCO_2022-07_N	----	----	----
					Client sampling date / time	14-Jul-2022 13:00	14-Jul-2022 09:45	----	----	----
						CG2209323-001	CG2209323-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	<2.0	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		182	173	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		222	211	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		6.8	8.6	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		4.1	5.2	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		188	182	----	----	----
conductivity	----	E100	2.0	µS/cm		526	505	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		290	274	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV		432	395	----	----	----
pH	----	E108	0.10	pH units		8.32	8.32	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		377	360	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		1.9	1.8	----	----	----
turbidity	----	E121	0.10	NTU		0.30	0.21	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	0.0103	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		3.77	3.77	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.241	0.265	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.743	<0.500 DLM, TKNI	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		5.13	4.81	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0020	<0.0010	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0011	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0038	0.0059	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		132	123	----	----	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		<0.50	<0.50	----	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		<0.50	<0.50	----	----	----
Ion Balance										

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	RG_LI8_WS_LAEMP_LCO_2022-07_N	----	----	----
					Client sampling date / time	14-Jul-2022 13:00	14-Jul-2022 09:45	----	----	----
						CG2209323-001	CG2209323-002	--------	--------	--------
						Result	Result	----	----	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		6.99	6.66	----	----	----
cation sum	----	EC101	0.10	meq/L		5.99	5.67	----	----	----
ion balance (cations/anions)	----	EC101	0.010	%		85.7	85.1	----	----	----
ion balance (APHA)	----	EC101	0.010	%		7.70	8.03	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0068	0.0078	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00019	0.00018	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00014	0.00015	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0408	0.0405	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L		<0.020	<0.020	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	<0.010	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L		0.237	0.208	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		63.4	63.2	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00014	0.00014	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L		<0.10	<0.10	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.010	<0.010	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0268	0.0252	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		26.1	24.4	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00120	0.00127	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00138	0.00138	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00466	0.00410	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.989	0.910	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L		26.5	23.9	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.15	2.02	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		4.01	3.70	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.152	0.154	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	RG_LI8_WS_LAEMP_LCO_2022-07_N	----	----	----
					Client sampling date / time	14-Jul-2022 13:00	14-Jul-2022 09:45	----	----	----
						CG2209323-001	CG2209323-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
sulfur, total	7704-34-9	E420	0.50	mg/L		44.3	41.6	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00217	0.00204	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0092	0.0094	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0013	0.0018	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00016	0.00016	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00012	0.00010	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0442	0.0422	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	<0.020	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.011	0.010	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.235	0.168	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		68.0	64.6	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		0.00014	0.00016	----	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L		<0.10	<0.10	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00031	0.00036	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	<0.010	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0256	0.0238	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		29.2	27.5	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00071	0.00072	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00131	0.00130	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00456	0.00423	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.04	0.978	----	----	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L		26.4	21.7	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.01	1.88	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	RG_LI8_WS_LAEMP_LCO_2022-07_N	----	----	----
					Client sampling date / time	14-Jul-2022 13:00	14-Jul-2022 09:45	----	----	----
						CG2209323-001	CG2209323-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		3.80	3.74	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.140	0.137	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		41.2	36.9	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00208	0.00198	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0092	0.0093	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2209323**	Page	: 1 of 16
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 15-Jul-2022 10:30
PO	: VPO00816101	Issue Date	: 25-Jul-2022 16:50
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS		
Sampler	: Tristin Vandemeulen		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_LI8_WS_LAEMP_LCO_2022-07_N	E298	14-Jul-2022	17-Jul-2022	----	----		17-Jul-2022	28 days	3 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E298	14-Jul-2022	17-Jul-2022	----	----		17-Jul-2022	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E235.Br-L	14-Jul-2022	----	----	----		16-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E235.Br-L	14-Jul-2022	----	----	----		16-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E235.Cl-L	14-Jul-2022	----	----	----		16-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E235.Cl-L	14-Jul-2022	----	----	----		16-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E378-U	14-Jul-2022	----	----	----		16-Jul-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E378-U	14-Jul-2022	----	----	----		16-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E235.F	14-Jul-2022	----	----	----		16-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E235.F	14-Jul-2022	----	----	----		16-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E235.NO3-L	14-Jul-2022	----	----	----		16-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E235.NO3-L	14-Jul-2022	----	----	----		16-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E235.NO2-L	14-Jul-2022	----	----	----		16-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E235.NO2-L	14-Jul-2022	----	----	----		16-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E235.SO4	14-Jul-2022	----	----	----		16-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E235.SO4	14-Jul-2022	----	----	----		16-Jul-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LI8_WS_LAEMP_LCO_2022-07_N	E318	14-Jul-2022	22-Jul-2022	----	----		22-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E318	14-Jul-2022	22-Jul-2022	----	----		22-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LI8_WS_LAEMP_LCO_2022-07_N	E372-U	14-Jul-2022	20-Jul-2022	----	----		22-Jul-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E372-U	14-Jul-2022	20-Jul-2022	----	----		22-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_LI8_WS_LAEMP_LCO_2022-07_N	E421.Cr-L	14-Jul-2022	24-Jul-2022	----	----		24-Jul-2022	180 days	10 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E421.Cr-L	14-Jul-2022	24-Jul-2022	----	----		24-Jul-2022	180 days	10 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
RG_LI8_WS_LAEMP_LCO_2022-07_N	E509	14-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	28 days	11 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E509	14-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	28 days	11 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
RG_LI8_WS_LAEMP_LCO_2022-07_N	E421	14-Jul-2022	24-Jul-2022	----	----		24-Jul-2022	180 days	10 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E421	14-Jul-2022	24-Jul-2022	----	----		24-Jul-2022	180 days	10 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LI8_WS_LAEMP_LCO_2022-07_N	E358-L	14-Jul-2022	21-Jul-2022	----	----		21-Jul-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E358-L	14-Jul-2022	21-Jul-2022	----	----		21-Jul-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LI8_WS_LAEMP_LCO_2022-07_N	E355-L	14-Jul-2022	21-Jul-2022	----	----		21-Jul-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E355-L	14-Jul-2022	21-Jul-2022	----	----		21-Jul-2022	28 days	7 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E283	14-Jul-2022	----	----	----		16-Jul-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E283	14-Jul-2022	----	----	----		16-Jul-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E290	14-Jul-2022	----	----	----		16-Jul-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E290	14-Jul-2022	----	----	----		16-Jul-2022	14 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E100	14-Jul-2022	----	----	----		16-Jul-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E100	14-Jul-2022	----	----	----		16-Jul-2022	28 days	2 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E125	14-Jul-2022	----	----	----		22-Jul-2022	0.25 hrs	195 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E125	14-Jul-2022	----	----	----		22-Jul-2022	0.25 hrs	198 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E108	14-Jul-2022	----	----	----		16-Jul-2022	0.25 hrs	45 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E108	14-Jul-2022	----	----	----		16-Jul-2022	0.25 hrs	48 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E162	14-Jul-2022	----	----	----		20-Jul-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E162	14-Jul-2022	----	----	----		20-Jul-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E160-L	14-Jul-2022	----	----	----		20-Jul-2022	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E160-L	14-Jul-2022	----	----	----		20-Jul-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LI8_WS_LAEMP_LCO_2022-07_N	E121	14-Jul-2022	----	----	----		16-Jul-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E121	14-Jul-2022	----	----	----		17-Jul-2022	3 days	3 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_LI8_WS_LAEMP_LCO_2022-07_N	E420.Cr-L	14-Jul-2022	----	----	----		21-Jul-2022	180 days	7 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E420.Cr-L	14-Jul-2022	----	----	----		21-Jul-2022	180 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LI8_WS_LAEMP_LCO_2022-07_N	E508	14-Jul-2022	----	----	----		24-Jul-2022	28 days	10 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E508	14-Jul-2022	----	----	----		24-Jul-2022	28 days	10 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_LI8_WS_LAEMP_LCO_2022-07_N	E420	14-Jul-2022	----	----	----		21-Jul-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	E420	14-Jul-2022	----	----	----		21-Jul-2022	180 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	565350	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	565353	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	566163	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	565524	1	10	10.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	565525	1	10	10.0	5.0	✓
Conductivity in Water	E100	565352	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	574896	1	5	20.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	575564	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	574895	1	5	20.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	572228	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	565426	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	565523	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	565526	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	565527	1	10	10.0	5.0	✓
ORP by Electrode	E125	573151	1	20	5.0	5.0	✓
pH by Meter	E108	565351	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	565522	1	14	7.1	5.0	✓
TDS by Gravimetry	E162	568399	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	568909	1	9	11.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	571643	1	8	12.5	5.0	✓
Total Mercury in Water by CVAAS	E508	575021	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	568907	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	572229	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	569613	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	565410	2	15	13.3	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	565350	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	565353	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	566163	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	565524	1	10	10.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	565525	1	10	10.0	5.0	✓
Conductivity in Water	E100	565352	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	574896	1	5	20.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	575564	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	574895	1	5	20.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	572228	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	565426	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	565523	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	565526	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	565527	1	10	10.0	5.0	✓
ORP by Electrode	E125	573151	1	20	5.0	5.0	✓
pH by Meter	E108	565351	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	565522	1	14	7.1	5.0	✓
TDS by Gravimetry	E162	568399	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	568909	1	9	11.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	571643	1	8	12.5	5.0	✓
Total Mercury in Water by CVAAS	E508	575021	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	568907	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	572229	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	569613	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	568391	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	565410	2	15	13.3	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	565350	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	565353	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	566163	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	565524	1	10	10.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	565525	1	10	10.0	5.0	✓
Conductivity in Water	E100	565352	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	574896	1	5	20.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	575564	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	574895	1	5	20.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	572228	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	565426	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	565523	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	565526	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	565527	1	10	10.0	5.0	✓
Sulfate in Water by IC	E235.SO4	565522	1	14	7.1	5.0	✓
TDS by Gravimetry	E162	568399	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	568909	1	9	11.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	571643	1	8	12.5	5.0	✓
Total Mercury in Water by CVAAS	E508	575021	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	568907	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	572229	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	569613	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	568391	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	565410	2	15	13.3	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	566163	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	565524	1	10	10.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	565525	1	10	10.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	574896	1	5	20.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	575564	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	574895	1	5	20.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	572228	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	565426	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	565523	1	10	10.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	565526	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	565527	1	10	10.0	5.0	✓
Sulfate in Water by IC	E235.SO4	565522	1	14	7.1	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	568909	1	9	11.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	571643	1	8	12.5	5.0	✓
Total Mercury in Water by CVAAS	E508	575021	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	568907	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	572229	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	569613	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2209323**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAMS	Date Samples Received	: 15-Jul-2022 10:30
PO	: VPO00816101	Date Analysis Commenced	: 16-Jul-2022
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS	Issue Date	: 25-Jul-2022 16:50
Sampler	: Tristin Vandemeulen		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Quality Control Report contains the following information:

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

Signatories

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

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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: 565350)											
CG2209304-001	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	8.0	7.6	0.4	Diff <2x LOR	----
Physical Tests (QC Lot: 565351)											
CG2209304-001	Anonymous	pH	----	E108	0.10	pH units	7.71	7.75	0.517%	4%	----
Physical Tests (QC Lot: 565352)											
CG2209304-001	Anonymous	conductivity	----	E100	2.0	µS/cm	2320	2340	0.858%	10%	----
Physical Tests (QC Lot: 565353)											
CG2209304-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	262	254	3.33%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	262	254	3.33%	20%	----
Physical Tests (QC Lot: 565410)											
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	turbidity	----	E121	0.10	NTU	0.21	0.22	0.009	Diff <2x LOR	----
Physical Tests (QC Lot: 565788)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	turbidity	----	E121	0.10	NTU	0.30	0.30	0.001	Diff <2x LOR	----
Physical Tests (QC Lot: 568399)											
CG2209304-009	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	595	585	1.70%	20%	----
Physical Tests (QC Lot: 573151)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	oxidation-reduction potential [ORP]	----	E125	0.10	mV	432	434	0.439%	15%	----
Anions and Nutrients (QC Lot: 565426)											
CG2209304-008	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 565522)											
CG2209118-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<0.30	<0.30	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 565523)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	fluoride	16984-48-8	E235.F	0.020	mg/L	0.241	0.243	0.619%	20%	----
Anions and Nutrients (QC Lot: 565524)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 565525)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	3.77	3.73	1.18%	20%	----
Anions and Nutrients (QC Lot: 565526)											

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: 565526) - continued											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	5.13	5.08	0.891%	20%	----
Anions and Nutrients (QC Lot: 565527)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0020	0.0015	0.0005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 566163)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 569613)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0038	0.0040	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 571643)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	Kjeldahl nitrogen, total [TKN]	----	E318	0.500	mg/L	0.743	<0.500	0.243	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 572228)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 572229)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 568907)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0068	0.0064	0.0003	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00019	0.00019	0.000004	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00014	0.00013	0.000003	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0408	0.0417	2.20%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.237 µg/L	0.000246	3.77%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	63.4	63.6	0.327%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0268	0.0270	0.723%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	26.1	26.4	0.980%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00120	0.00134	10.6%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00138	0.00138	0.651%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00466	0.00459	0.00007	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: 568907) - continued											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	potassium, total	7440-09-7	E420	0.050	mg/L	0.989	1.01	2.03%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	26.5 µg/L	0.0271	2.05%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.15	2.13	0.987%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	4.01	3.94	1.99%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.152	0.154	1.72%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	44.3	44.4	0.197%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00217	0.00213	1.55%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0092	0.0093	0.0001	Diff <2x LOR	----
Total Metals (QC Lot: 568909)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00014	0.00013	0.000006	Diff <2x LOR	----
Total Metals (QC Lot: 575021)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 574895)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0013	0.0010	0.0003	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00016	0.00016	0.000002	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00012	0.00011	0.000004	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0442	0.0431	2.45%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.011	0.011	0.0002	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.235 µg/L	0.000228	3.27%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	68.0	68.2	0.384%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00031	0.00030	0.00001	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0256	0.0255	0.330%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	29.2	28.4	2.99%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00071	0.00070	0.000009	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: 574895) - continued											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00131	0.00130	0.257%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00456	0.00453	0.00003	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.04	0.998	3.78%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	26.4 µg/L	0.0266	0.716%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.01	1.97	1.68%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	3.80	3.73	1.68%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.140	0.141	0.495%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	41.2	40.9	0.605%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00208	0.00206	0.670%	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	0.0092	0.0091	0.00006	Diff <2x LOR	----
Dissolved Metals (QC Lot: 574896)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00014	0.00013	0.000010	Diff <2x LOR	----
Dissolved Metals (QC Lot: 575564)											
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	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: 565350)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 565352)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 565353)						
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: 565410)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 565788)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 568391)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 568399)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 565426)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 565522)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 565523)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 565524)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 565525)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 565526)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 565527)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 566163)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 569613)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 569613) - continued						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 571643)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 572228)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 572229)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 568907)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 568907) - continued						
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	----
Total Metals (QCLot: 568909)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 575021)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 574895)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 574895) - continued						
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	----
Dissolved Metals (QCLot: 574896)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	MBRR
Dissolved Metals (QCLot: 575564)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Qualifiers

Qualifier	Description
MBRR	*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*

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 565350)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	102	85.0	115	----
Physical Tests (QCLot: 565351)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 565352)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	95.5	90.0	110	----
Physical Tests (QCLot: 565353)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	105	85.0	115	----
Physical Tests (QCLot: 565410)									
turbidity	----	E121	0.1	NTU	200 NTU	98.6	85.0	115	----
Physical Tests (QCLot: 565788)									
turbidity	----	E121	0.1	NTU	200 NTU	96.8	85.0	115	----
Physical Tests (QCLot: 568391)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	93.8	85.0	115	----
Physical Tests (QCLot: 568399)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	99.8	85.0	115	----
Physical Tests (QCLot: 573151)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	99.2	95.4	104	----
Anions and Nutrients (QCLot: 565426)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	99.3	80.0	120	----
Anions and Nutrients (QCLot: 565522)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	97.8	90.0	110	----
Anions and Nutrients (QCLot: 565523)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	96.5	90.0	110	----
Anions and Nutrients (QCLot: 565524)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	96.2	85.0	115	----
Anions and Nutrients (QCLot: 565525)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	96.4	90.0	110	----
Anions and Nutrients (QCLot: 565526)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.0	90.0	110	----
Anions and Nutrients (QCLot: 565527)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	97.8	90.0	110	----
Anions and Nutrients (QCLot: 566163)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 566163) - continued									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 569613)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 571643)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	97.3	75.0	125	----
Organic / Inorganic Carbon (QCLot: 572228)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	91.6	80.0	120	----
Organic / Inorganic Carbon (QCLot: 572229)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	92.6	80.0	120	----
Total Metals (QCLot: 568907)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	105	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	112	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	108	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	97.9	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.2	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	114	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	104	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	95.2	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.1	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	104	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	101	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	109	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	108	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	99.0	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	111	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.0	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 568907) - continued									
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	97.8	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	103	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	98.8	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	100	80.0	120	----
Total Metals (QCLot: 568909)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Total Metals (QCLot: 575021)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 574895)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	99.6	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	95.8	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.2	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	93.8	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	97.2	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.0	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	97.4	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	95.1	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.9	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	95.8	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.4	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	101	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.2	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	96.5	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	96.2	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.2	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	97.9	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.6	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	95.8	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	88.0	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	98.5	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	92.6	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 574895) - continued									
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	101	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	93.1	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.6	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	97.5	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	96.3	80.0	120	----
Dissolved Metals (QCLot: 574896)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	96.4	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	92.1	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 565426)										
CG2209304-009	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0469 mg/L	0.05 mg/L	93.8	70.0	130	----
Anions and Nutrients (QCLot: 565522)										
CG2209118-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	114 mg/L	100 mg/L	114	75.0	125	----
Anions and Nutrients (QCLot: 565523)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	fluoride	16984-48-8	E235.F	0.915 mg/L	1 mg/L	91.5	75.0	125	----
Anions and Nutrients (QCLot: 565524)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	bromide	24959-67-9	E235.Br-L	0.486 mg/L	0.5 mg/L	97.2	75.0	125	----
Anions and Nutrients (QCLot: 565525)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	chloride	16887-00-6	E235.Cl-L	91.4 mg/L	100 mg/L	91.4	75.0	125	----
Anions and Nutrients (QCLot: 565526)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 565527)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	nitrite (as N)	14797-65-0	E235.NO2-L	0.470 mg/L	0.5 mg/L	94.0	75.0	125	----
Anions and Nutrients (QCLot: 566163)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	ammonia, total (as N)	7664-41-7	E298	0.103 mg/L	0.1 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 569613)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	phosphorus, total	7723-14-0	E372-U	0.0596 mg/L	0.0676 mg/L	88.2	70.0	130	----
Anions and Nutrients (QCLot: 571643)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	Kjeldahl nitrogen, total [TKN]	----	E318	2.47 mg/L	2.5 mg/L	98.7	70.0	130	----
Organic / Inorganic Carbon (QCLot: 572228)										
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	carbon, dissolved organic [DOC]	----	E358-L	5.55 mg/L	5 mg/L	111	70.0	130	----
Organic / Inorganic Carbon (QCLot: 572229)										
CG2209323-001	RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	carbon, total organic [TOC]	----	E355-L	5.28 mg/L	5 mg/L	106	70.0	130	----
Total Metals (QCLot: 568907)										

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: 568907) - continued										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	aluminum, total	7429-90-5	E420	0.192 mg/L	0.2 mg/L	96.0	70.0	130	----
		antimony, total	7440-36-0	E420	0.0215 mg/L	0.02 mg/L	107	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0370 mg/L	0.04 mg/L	92.5	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00986 mg/L	0.01 mg/L	98.6	70.0	130	----
		boron, total	7440-42-8	E420	0.093 mg/L	0.1 mg/L	93.1	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0186 mg/L	0.02 mg/L	92.8	70.0	130	----
		copper, total	7440-50-8	E420	0.0186 mg/L	0.02 mg/L	92.9	70.0	130	----
		iron, total	7439-89-6	E420	1.87 mg/L	2 mg/L	93.7	70.0	130	----
		lead, total	7439-92-1	E420	0.0188 mg/L	0.02 mg/L	94.1	70.0	130	----
		lithium, total	7439-93-2	E420	0.0999 mg/L	0.1 mg/L	99.9	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0185 mg/L	0.02 mg/L	92.3	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0215 mg/L	0.02 mg/L	108	70.0	130	----
		nickel, total	7440-02-0	E420	0.0364 mg/L	0.04 mg/L	91.0	70.0	130	----
		potassium, total	7440-09-7	E420	3.86 mg/L	4 mg/L	96.6	70.0	130	----
		selenium, total	7782-49-2	E420	0.0390 mg/L	0.04 mg/L	97.5	70.0	130	----
		silicon, total	7440-21-3	E420	9.49 mg/L	10 mg/L	94.9	70.0	130	----
		silver, total	7440-22-4	E420	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00369 mg/L	0.004 mg/L	92.2	70.0	130	----
		tin, total	7440-31-5	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		titanium, total	7440-32-6	E420	0.0379 mg/L	0.04 mg/L	94.8	70.0	130	----
		uranium, total	7440-61-1	E420	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0987 mg/L	0.1 mg/L	98.7	70.0	130	----
		zinc, total	7440-66-6	E420	0.372 mg/L	0.4 mg/L	93.0	70.0	130	----
Total Metals (QCLot: 568909)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	chromium, total	7440-47-3	E420.Cr-L	0.0390 mg/L	0.04 mg/L	97.5	70.0	130	----
Total Metals (QCLot: 575021)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	mercury, total	7439-97-6	E508	0.000104 mg/L	0.0001 mg/L	104	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: 574895)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	aluminum, dissolved	7429-90-5	E421	0.187 mg/L	0.2 mg/L	93.7	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0393 mg/L	0.04 mg/L	98.3	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00833 mg/L	0.01 mg/L	83.3	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.097 mg/L	0.1 mg/L	97.2	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00392 mg/L	0.004 mg/L	98.1	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0182 mg/L	0.02 mg/L	91.1	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0180 mg/L	0.02 mg/L	90.0	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.90 mg/L	2 mg/L	94.8	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0189 mg/L	0.02 mg/L	94.4	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0977 mg/L	0.1 mg/L	97.7	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0197 mg/L	0.02 mg/L	98.6	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0363 mg/L	0.04 mg/L	90.8	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.59 mg/L	4 mg/L	89.8	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.12 mg/L	10 mg/L	91.2	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00356 mg/L	0.004 mg/L	89.1	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00381 mg/L	0.004 mg/L	95.2	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0189 mg/L	0.02 mg/L	94.5	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0378 mg/L	0.04 mg/L	94.5	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00367 mg/L	0.004 mg/L	91.8	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0972 mg/L	0.1 mg/L	97.2	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.374 mg/L	0.4 mg/L	93.4	70.0	130	----
Dissolved Metals (QCLot: 574896)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	chromium, dissolved	7440-47-3	E421.Cr-L	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
Dissolved Metals (QCLot: 575564)										
CG2209323-002	RG_LI8_WS_LAEMP_LCO_2022-07_N	mercury, dissolved	7439-97-6	E509	0.0000973 mg/L	0.0001 mg/L	97.3	70.0	130	----

Teck

Page 1 of 2

COC ID: REP_LAEMP_LCO_2022_JULY_ALS | TURNAROUND TIME: Regular | RUSH: N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	ALS Calgary			Report Format / Distribution	Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1: aquascilab@teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2: teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	2559 29 Street NE			Email 3: Teck.Lab.Results@teck.com	X	X	X
								Email 4: Jessica.Ritz@Teck.com	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5: Tyler.Mehler@Minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6: lbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	403 407 1794			PO number	VPO00816101		

SAMPLE DETAILS | ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24 hr)	G=Grab C=Comp	# Of Cont.	Fil.	F	N	F	N	F	N	N					
								PRESERV.	H2SO4	H2SO4	HCL	NONE	HNO3	HNO3	NONE					
								ANALYSIS	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	HG-T-U-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-METNHG-T-CL	TECKCOAL-ROUTINE-VA					
RG_LIDCOM_WS_LAEMP_LCO-2022-07-N	RG-LIDCOM	WS	NO	2022-07-14	13:00	G	7		X	X	X	X	X	X	X					
RG_L18_WS_LAEMP_LCO-2022-07_N	RG-L18	WS	NO	2022-07-14	09:45	G	7		X	X	X	X	X	X	X					
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														

Environmental Division
Calgary
Work Order Reference
CG2209323

Telephone : +1 403 407 1800

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Rick Smit/Lotic environmental	2022-07-14 17:00		7/15 10:30

SERVICE REQUEST (rush - subject to availability)

Regular (default)	X
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Rick Smit	Mobile #	403-586-3241
Sampler's Signature		Date/Time	2022-07-14 17:00

WATER CHEMISTRY

ALS Laboratory Report CG2209155

(Finalized July 29, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2209155**	Page	: 1 of 7
Amendment	: **1**		
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 13-Jul-2022 10:20
PO	: VPO00816101	Date Analysis Commenced	: 13-Jul-2022
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS	Issue Date	: 29-Jul-2022 15:20
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kyle Chang	Lab Assistant	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Russell Zhang		Metals, Burnaby, British Columbia
Sara Niroomand		Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_SLINE_WS_LAEMP_LCO_2022-07_N	RG_LCUT_WS_LAEMP_LCO_2022-07_N	RG_LILC3_WS_LAEMP_LCO_2022-07_N	RG_RIVER_WS_LAEMP_LCO_2022-07_NP	----
					Client sampling date / time	12-Jul-2022 14:00	12-Jul-2022 09:30	12-Jul-2022 11:45	12-Jul-2022 11:00	----
						CG2209155-001	CG2209155-002	CG2209155-003	CG2209155-004	--------
						Result	Result	Result	Result	----
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	<2.0	<2.0	<2.0	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		120	226	184	182	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		146	276	224	222	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		120	226	184	182	----
conductivity	----	E100	2.0	µS/cm		230	552	665	668	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		131	304	375	370	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV		324	414	446	386	----
pH	----	E108	0.10	pH units		8.24	7.84	8.04	8.04	----
solids, total dissolved [TDS]	----	E162	10	mg/L		152	392	496	488	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
turbidity	----	E121	0.10	NTU		0.29	0.22	0.14	0.22	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	0.0140	<0.0050	0.0230	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		0.14	3.75	5.24	5.12	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.205	0.190	0.183	0.176	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		<0.500 DLM, TKNI	0.838	1.24	0.629 TKNI	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.121	6.34	7.51	7.47	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0022	0.0010	0.0022	0.0025	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0040	0.0023	0.0024	0.0023	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		18.0	125	170	168	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		0.86	<0.50	<0.50	<0.50	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		0.79	<0.50	<0.50	<0.50	----
Ion Balance										

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_SLINE_WS_LAEMP_LCO_2022-07_N	RG_LCUT_WS_LAEMP_LCO_2022-07_N	RG_LILC3_WS_LAEMP_LCO_2022-07_N	RG_RIVER_WS_LAEMP_LCO_2022-07_NP	----
					Client sampling date / time	12-Jul-2022 14:00	12-Jul-2022 09:30	12-Jul-2022 11:45	12-Jul-2022 11:00	----
						CG2209155-001	CG2209155-002	CG2209155-003	CG2209155-004	--------
						Result	Result	Result	Result	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		2.80	7.69	7.91	7.82	----
cation sum	----	EC101	0.10	meq/L		2.65	6.32	7.77	7.66	----
ion balance (cations/anions)	----	EC101	0.010	%		94.6	82.2	98.2	98.0	----
ion balance (APHA)	----	EC101	0.010	%		2.75	9.78	0.893	1.03	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0105	0.0043	0.0038	0.0046	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	0.00027	0.00028	0.00030	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00012	0.00012	0.00013	0.00014	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0264	0.0303	0.0338	0.0328	----
beryllium, total	7440-41-7	E420	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	0.011	0.013	0.013	----
cadmium, total	7440-43-9	E420	0.0050	µg/L		0.0181	0.471	0.485	0.460	----
calcium, total	7440-70-2	E420	0.050	mg/L		34.1	67.5	81.5	84.3	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00018	0.00014	0.00014	0.00014	----
cobalt, total	7440-48-4	E420	0.10	µg/L		<0.10	0.10	<0.10	<0.10	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0014	0.0333	0.0369	0.0379	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		9.02	28.6	37.0	38.0	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00030	0.00020	0.00254	0.00243	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000782	0.00145	0.00172	0.00165	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	0.00855	0.00898	0.00870	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.301	1.34	1.50	1.47	----
selenium, total	7782-49-2	E420	0.050	µg/L		0.755	28.3	43.5	42.6	----
silicon, total	7440-21-3	E420	0.10	mg/L		1.66	1.98	2.18	2.04	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		0.462	4.84	5.56	5.66	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0810	0.162	0.182	0.174	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_SLINE_WS_LAEMP_LCO_2022-07_N	RG_LCUT_WS_LAEMP_LCO_2022-07_N	RG_LILC3_WS_LAEMP_LCO_2022-07_N	RG_RIVER_WS_LAEMP_LCO_2022-07_NP	----
					Client sampling date / time	12-Jul-2022 14:00	12-Jul-2022 09:30	12-Jul-2022 11:45	12-Jul-2022 11:00	----
						CG2209155-001	CG2209155-002	CG2209155-003	CG2209155-004	--------
						Result	Result	Result	Result	----
Total Metals										
sulfur, total	7704-34-9	E420	0.50	mg/L		6.54	45.9	65.0	65.4	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	0.000012	0.000013	0.000014	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000980	0.00246	0.00307	0.00300	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	0.0194	0.0209	0.0193	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0024	0.0013	0.0025	0.0011	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	0.00026	0.00028	0.00028	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00012	0.00011	0.00011	0.00011	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0252	0.0290	0.0310	0.0315	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	0.011	0.013	0.013	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.0161	0.453	0.474	0.476	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		36.4	71.3	85.4	84.5	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		0.00016	0.00011	0.00012	0.00012	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00023	0.00051	0.00055	0.00048	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0015	0.0340	0.0378	0.0389	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		9.80	30.6	39.2	38.5	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		<0.00010	0.00012	0.00209	0.00207	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000771	0.00142	0.00171	0.00171	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	0.00818	0.00860	0.00879	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.300	1.29	1.41	1.40	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L		0.742	28.0	41.3	40.9	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.61	1.84	1.93	1.92	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_SLINE_WS_LAEMP_LCO_2022-07_N	RG_LCUT_WS_LAEMP_LCO_2022-07_N	RG_LILC3_WS_LAEMP_LCO_2022-07_N	RG_RIVER_WS_LAEMP_LCO_2022-07_NP	----
					Client sampling date / time	12-Jul-2022 14:00	12-Jul-2022 09:30	12-Jul-2022 11:45	12-Jul-2022 11:00	----
						CG2209155-001	CG2209155-002	CG2209155-003	CG2209155-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		0.439	4.90	5.65	5.45	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.0789	0.157	0.174	0.174	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		6.63	44.0	58.7	58.0	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	0.000013	0.000014	0.000013	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000953	0.00238	0.00296	0.00291	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0028	0.0190	0.0192	0.0198	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2209155**	Page	: 1 of 21
Amendment	: 1		
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 13-Jul-2022 10:20
PO	: VPO00816101	Issue Date	: 29-Jul-2022 15:20
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS		
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-07_N	E298	12-Jul-2022	13-Jul-2022	----	----		13-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LILC3_WS_LAEMP_LCO_2022-07_N	E298	12-Jul-2022	13-Jul-2022	----	----		13-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E298	12-Jul-2022	13-Jul-2022	----	----		13-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_SLINE_WS_LAEMP_LCO_2022-07_N	E298	12-Jul-2022	13-Jul-2022	----	----		13-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-07_N	E235.Br-L	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-07_N	E235.Br-L	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E235.Br-L	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-07_N	E235.Br-L	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-07_N	E235.Cl-L	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-07_N	E235.Cl-L	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E235.Cl-L	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-07_N	E235.Cl-L	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-07_N	E378-U	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-07_N	E378-U	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E378-U	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-07_N	E378-U	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-07_N	E235.F	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-07_N	E235.F	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E235.F	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-07_N	E235.F	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-07_N	E235.NO3-L	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-07_N	E235.NO3-L	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E235.NO3-L	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-07_N	E235.NO3-L	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-07_N	E235.NO2-L	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-07_N	E235.NO2-L	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E235.NO2-L	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_SLINE_WS_LAEMP_LCO_2022-07_N	E235.NO2-L	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-07_N	E235.SO4	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-07_N	E235.SO4	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E235.SO4	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_SLINE_WS_LAEMP_LCO_2022-07_N	E235.SO4	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-07_N	E318	12-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LILC3_WS_LAEMP_LCO_2022-07_N	E318	12-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	28 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E318	12-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_SLINE_WS_LAEMP_LCO_2022-07_N	E318	12-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-07_N	E372-U	12-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LILC3_WS_LAEMP_LCO_2022-07_N	E372-U	12-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E372-U	12-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_SLINE_WS_LAEMP_LCO_2022-07_N	E372-U	12-Jul-2022	19-Jul-2022	----	----		19-Jul-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_LILC3_WS_LAEMP_LCO_2022-07_N	E421.Cr-L	12-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_SLINE_WS_LAEMP_LCO_2022-07_N	E421.Cr-L	12-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-07_N	E421.Cr-L	12-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E421.Cr-L	12-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LCUT_WS_LAEMP_LCO_2022-07_N	E509	12-Jul-2022	20-Jul-2022	----	----		20-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LILC3_WS_LAEMP_LCO_2022-07_N	E509	12-Jul-2022	20-Jul-2022	----	----		20-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E509	12-Jul-2022	20-Jul-2022	----	----		20-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_SLINE_WS_LAEMP_LCO_2022-07_N	E509	12-Jul-2022	20-Jul-2022	----	----		20-Jul-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_LILC3_WS_LAEMP_LCO_2022-07_N	E421	12-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_SLINE_WS_LAEMP_LCO_2022-07_N	E421	12-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_LCUT_WS_LAEMP_LCO_2022-07_N	E421	12-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E421	12-Jul-2022	18-Jul-2022	----	----		19-Jul-2022	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LCUT_WS_LAEMP_LCO_2022-07_N	E358-L	12-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LILC3_WS_LAEMP_LCO_2022-07_N	E358-L	12-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E358-L	12-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_SLINE_WS_LAEMP_LCO_2022-07_N	E358-L	12-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LCUT_WS_LAEMP_LCO_2022-07_N	E355-L	12-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LILC3_WS_LAEMP_LCO_2022-07_N	E355-L	12-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E355-L	12-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_SLINE_WS_LAEMP_LCO_2022-07_N	E355-L	12-Jul-2022	19-Jul-2022	----	----		21-Jul-2022	28 days	9 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-07_N	E283	12-Jul-2022	----	----	----		14-Jul-2022	14 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Acidity by Titration										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-07_N	E283	12-Jul-2022	----	----	----		14-Jul-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E283	12-Jul-2022	----	----	----		14-Jul-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_SLINE_WS_LAEMP_LCO_2022-07_N	E283	12-Jul-2022	----	----	----		14-Jul-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-07_N	E290	12-Jul-2022	----	----	----		14-Jul-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-07_N	E290	12-Jul-2022	----	----	----		14-Jul-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E290	12-Jul-2022	----	----	----		14-Jul-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_SLINE_WS_LAEMP_LCO_2022-07_N	E290	12-Jul-2022	----	----	----		14-Jul-2022	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-07_N	E100	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-07_N	E100	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E100	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-07_N	E100	12-Jul-2022	----	----	----		14-Jul-2022	28 days	2 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-07_N	E125	12-Jul-2022	----	----	----		19-Jul-2022	0.25 hrs	166 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-07_N	E125	12-Jul-2022	----	----	----		19-Jul-2022	0.25 hrs	168 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E125	12-Jul-2022	----	----	----		19-Jul-2022	0.25 hrs	169 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-07_N	E125	12-Jul-2022	----	----	----		19-Jul-2022	0.25 hrs	170 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-07_N	E108	12-Jul-2022	----	----	----		14-Jul-2022	0.25 hrs	45 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-07_N	E108	12-Jul-2022	----	----	----		14-Jul-2022	0.25 hrs	47 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E108	12-Jul-2022	----	----	----		14-Jul-2022	0.25 hrs	48 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-07_N	E108	12-Jul-2022	----	----	----		14-Jul-2022	0.25 hrs	49 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-07_N	E162	12-Jul-2022	----	----	----		18-Jul-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-07_N	E162	12-Jul-2022	----	----	----		18-Jul-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E162	12-Jul-2022	----	----	----		18-Jul-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-07_N	E162	12-Jul-2022	----	----	----		18-Jul-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_LCUT_WS_LAEMP_LCO_2022-07_N	E160-L	12-Jul-2022	----	----	----		18-Jul-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_LILC3_WS_LAEMP_LCO_2022-07_N	E160-L	12-Jul-2022	----	----	----		18-Jul-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E160-L	12-Jul-2022	----	----	----		18-Jul-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_SLINE_WS_LAEMP_LCO_2022-07_N	E160-L	12-Jul-2022	----	----	----		18-Jul-2022	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-07_N	E121	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-07_N	E121	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E121	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_SLINE_WS_LAEMP_LCO_2022-07_N	E121	12-Jul-2022	----	----	----		14-Jul-2022	3 days	2 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_LCUT_WS_LAEMP_LCO_2022-07_N	E420.Cr-L	12-Jul-2022	----	----	----		17-Jul-2022	180 days	5 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_LILC3_WS_LAEMP_LCO_2022-07_N	E420.Cr-L	12-Jul-2022	----	----	----		17-Jul-2022	180 days	5 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_SLINE_WS_LAEMP_LCO_2022-07_N	E420.Cr-L	12-Jul-2022	----	----	----		17-Jul-2022	180 days	5 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E420.Cr-L	12-Jul-2022	----	----	----		18-Jul-2022	180 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LCUT_WS_LAEMP_LCO_2022-07_N	E508	12-Jul-2022	----	----	----		20-Jul-2022	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LILC3_WS_LAEMP_LCO_2022-07_N	E508	12-Jul-2022	----	----	----		20-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E508	12-Jul-2022	----	----	----		20-Jul-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_SLINE_WS_LAEMP_LCO_2022-07_N	E508	12-Jul-2022	----	----	----		20-Jul-2022	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_LCUT_WS_LAEMP_LCO_2022-07_N	E420	12-Jul-2022	----	----	----		17-Jul-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_LILC3_WS_LAEMP_LCO_2022-07_N	E420	12-Jul-2022	----	----	----		17-Jul-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_SLINE_WS_LAEMP_LCO_2022-07_N	E420	12-Jul-2022	----	----	----		17-Jul-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_RIVER_WS_LAEMP_LCO_2022-07_NP	E420	12-Jul-2022	----	----	----		18-Jul-2022	180 days	6 days	✓

Legend & Qualifier Definitions

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

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	562431	1	18	5.5	5.0	✓
Alkalinity Species by Titration	E290	562390	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	561445	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	562709	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	562705	1	20	5.0	5.0	✓
Conductivity in Water	E100	562389	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	565735	1	7	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	569406	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	565736	2	12	16.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	568728	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	562295	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	562704	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	562706	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	562707	1	20	5.0	5.0	✓
ORP by Electrode	E125	566201	1	20	5.0	5.0	✓
pH by Meter	E108	562388	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	562710	1	12	8.3	5.0	✓
TDS by Gravimetry	E162	564856	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	565269	2	15	13.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	566816	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	569412	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	565270	3	38	7.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	568729	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	562817	2	40	5.0	5.0	✓
Turbidity by Nephelometry	E121	562145	2	40	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	562431	1	18	5.5	5.0	✓
Alkalinity Species by Titration	E290	562390	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	561445	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	562709	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	562705	1	20	5.0	5.0	✓
Conductivity in Water	E100	562389	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	565735	1	7	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	569406	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	565736	1	12	8.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	568728	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	562295	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	562704	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	562706	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	562707	1	20	5.0	5.0	✓
ORP by Electrode	E125	566201	1	20	5.0	5.0	✓
pH by Meter	E108	562388	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	562710	1	12	8.3	5.0	✓
TDS by Gravimetry	E162	564856	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	565269	2	15	13.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	566816	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	569412	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	565270	2	38	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	568729	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	562817	2	40	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	564848	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	562145	2	40	5.0	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	562431	1	18	5.5	5.0	✓
Alkalinity Species by Titration	E290	562390	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	561445	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	562709	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	562705	1	20	5.0	5.0	✓
Conductivity in Water	E100	562389	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	565735	1	7	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	569406	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	565736	2	12	16.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	568728	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	562295	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	562704	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	562706	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	562707	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	562710	1	12	8.3	5.0	✓
TDS by Gravimetry	E162	564856	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	565269	2	15	13.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	566816	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	569412	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	565270	2	38	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	568729	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	562817	2	40	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	564848	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	562145	2	40	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	561445	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	562709	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	562705	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	565735	1	7	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	569406	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	565736	2	12	16.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	568728	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	562295	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	562704	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	562706	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	562707	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	562710	1	12	8.3	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	565269	2	15	13.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	566816	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	569412	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	565270	2	38	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	568729	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	562817	2	40	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2209155**	Page	: 1 of 22
Amendment	: **1**		
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 13-Jul-2022 10:20
PO	: VPO00816101	Date Analysis Commenced	: 13-Jul-2022
C-O-C number	: REP_LAEMP_LCO_2022_JULY_ALS	Issue Date	: 29-Jul-2022 15:20
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
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Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
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Russell Zhang		Vancouver Metals, Burnaby, British Columbia
Sara Niroomand		Calgary Inorganics, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 562145)											
CG2209139-005	Anonymous	turbidity	----	E121	0.10	NTU	0.91	0.85	0.06	Diff <2x LOR	----
Physical Tests (QC Lot: 562388)											
CG2209154-001	Anonymous	pH	----	E108	0.10	pH units	8.06	8.11	0.618%	4%	----
Physical Tests (QC Lot: 562389)											
CG2209154-001	Anonymous	conductivity	----	E100	2.0	µS/cm	162	162	0.247%	10%	----
Physical Tests (QC Lot: 562390)											
CG2209154-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	92.5	92.4	0.108%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	92.5	92.4	0.108%	20%	----
Physical Tests (QC Lot: 562431)											
CG2209154-009	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 562566)											
CG2209129-006	Anonymous	turbidity	----	E121	0.10	NTU	1.47	1.43	2.62%	15%	----
Physical Tests (QC Lot: 564856)											
CG2209154-008	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	135	132	2	Diff <2x LOR	----
Physical Tests (QC Lot: 566201)											
CG2209154-001	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	428	422	1.41%	15%	----
Anions and Nutrients (QC Lot: 561445)											
CG2209149-011	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 562295)											
CG2209154-009	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0113	0.0116	2.62%	20%	----
Anions and Nutrients (QC Lot: 562704)											
CG2209105-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 562705)											
CG2209105-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	0.14	0.10	0.04	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 562706)											
CG2209105-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0590	0.0523	12.0%	20%	----
Anions and Nutrients (QC Lot: 562707)											
CG2209105-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0014	0.0015	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 562709)											

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: 562709) - continued											
CG2209105-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 562710)											
CG2209137-003	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	35.6	36.0	0.889%	20%	----
Anions and Nutrients (QC Lot: 562817)											
CG2209149-005	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0105	0.0100	0.0005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 562818)											
CG2209155-002	RG_LCUT_WS_LAEMP_LCO_2022-07_N	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0023	0.0024	0.00006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 566816)											
CG2209140-003	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	TKND
Organic / Inorganic Carbon (QC Lot: 568728)											
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.86	0.79	0.08	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 568729)											
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.79	0.88	0.09	Diff <2x LOR	----
Total Metals (QC Lot: 565269)											
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00018	0.00016	0.00002	Diff <2x LOR	----
Total Metals (QC Lot: 565270)											
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	sodium, total	7440-23-5	E420	0.050	mg/L	0.462	0.480	0.018	Diff <2x LOR	----
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0105	0.0097	0.0008	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00012	0.00012	0.0000004	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0264	0.0266	0.803%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0181 µg/L	0.0000226	0.0000045	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	34.1	33.9	0.546%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0014	0.0014	0.000006	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	9.02	9.25	2.55%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00030	0.00036	0.00006	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: 565270) - continued											
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000782	0.000794	1.58%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.301	0.311	0.010	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.755 µg/L	0.000831	9.62%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.66	1.79	7.51%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0810	0.0837	3.25%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	6.54	6.63	1.40%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000980	0.00102	4.02%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	0.0032	0.0002	Diff <2x LOR	----
Total Metals (QC Lot: 565291)											
CG2209155-004	RG_RIVER_WS_LAEMP_LCO_2022-07_NP	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0046	0.0040	0.0006	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00030	0.00028	0.00002	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00014	0.00013	0.000008	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0328	0.0318	3.11%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.013	0.014	0.0004	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.460 µg/L	0.000480	4.11%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	84.3	82.1	2.55%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	0.00010	0.000004	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0379	0.0382	0.726%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	38.0	38.8	2.24%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00243	0.00256	5.10%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00165	0.00169	2.19%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00870	0.00862	0.958%	20%	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.47	1.50	1.86%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	42.6 µg/L	0.0419	1.72%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 565291) - continued											
CG2209155-004	RG_RIVER_WS_LAEMP_LCO_2022-07_NP	silicon, total	7440-21-3	E420	0.10	mg/L	2.04	2.04	0.285%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	5.66	5.74	1.46%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.174	0.174	0.177%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	65.4	65.4	0.155%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000014	0.000014	0.0000004	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00300	0.00300	0.185%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0193	0.0200	0.0006	Diff <2x LOR	----
Total Metals (QC Lot: 565292)											
CG2209155-004	RG_RIVER_WS_LAEMP_LCO_2022-07_NP	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00014	0.00015	0.00001	Diff <2x LOR	----
Total Metals (QC Lot: 569412)											
CG2209154-008	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 565735)											
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00016	0.00014	0.00002	Diff <2x LOR	----
Dissolved Metals (QC Lot: 565736)											
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0024	0.0022	0.0002	Diff <2x LOR	----
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00012	0.00012	0.000002	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0252	0.0255	1.04%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0161 µg/L	0.0000145	0.0000016	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	36.4	36.4	0.234%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00023	0.00023	0.0000004	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0015	0.0015	0.00003	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	9.80	9.69	1.07%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 565736) - continued											
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000771	0.000775	0.461%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.300	0.292	0.008	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.742 µg/L	0.000784	5.47%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.61	1.60	0.542%	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	0.439	0.431	0.008	Diff <2x LOR	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0789	0.0784	0.711%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	6.63	6.36	4.28%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000953	0.000952	0.138%	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	0.0028	0.0026	0.0001	Diff <2x LOR	----
Dissolved Metals (QC Lot: 569406)											
CG2209154-008	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Qualifiers

Qualifier	*Description*
TKND	*TKN duplication was poor due to interference from high nitrate, which causes negative bias on TKN.*

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: 562145)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 562389)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 562390)						
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: 562431)						
acidity (as CaCO3)	----	E283	2	mg/L	2.2	----
Physical Tests (QCLot: 562566)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 564848)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 564856)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 561445)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 562295)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 562704)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 562705)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 562706)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 562707)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 562709)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 562710)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 562817)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 562817) - continued						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 562818)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 566816)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 568728)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 568729)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 565269)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 565270)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 565270) - continued						
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
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	----
Total Metals (QCLot: 565291)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 565291) - continued						
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	----
Total Metals (QCLot: 565292)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 569412)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 565735)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 565736)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	MBRR
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 565736) - continued						
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
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	----
Dissolved Metals (QCLot: 569406)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Qualifiers

Qualifier	Description
MBRR	*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*

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 562145)									
turbidity	----	E121	0.1	NTU	200 NTU	102	85.0	115	----
Physical Tests (QCLot: 562388)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 562389)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.3	90.0	110	----
Physical Tests (QCLot: 562390)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 562431)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	102	85.0	115	----
Physical Tests (QCLot: 562566)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 564848)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	92.7	85.0	115	----
Physical Tests (QCLot: 564856)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	100	85.0	115	----
Physical Tests (QCLot: 566201)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	97.8	95.4	104	----
Anions and Nutrients (QCLot: 561445)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	95.6	85.0	115	----
Anions and Nutrients (QCLot: 562295)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	100	80.0	120	----
Anions and Nutrients (QCLot: 562704)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 562705)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	99.6	90.0	110	----
Anions and Nutrients (QCLot: 562706)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 562707)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	97.1	90.0	110	----
Anions and Nutrients (QCLot: 562709)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	99.7	85.0	115	----
Anions and Nutrients (QCLot: 562710)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 562710) - continued									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 562817)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	106	80.0	120	----
Anions and Nutrients (QCLot: 562818)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	101	80.0	120	----
Anions and Nutrients (QCLot: 566816)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	98.4	75.0	125	----
Organic / Inorganic Carbon (QCLot: 568728)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	104	80.0	120	----
Organic / Inorganic Carbon (QCLot: 568729)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	99.2	80.0	120	----
Total Metals (QCLot: 565269)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	93.3	80.0	120	----
Total Metals (QCLot: 565270)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	95.9	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	99.4	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	97.3	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	92.8	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	89.6	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	94.4	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	87.7	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	93.1	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	92.9	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	94.0	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	93.0	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	96.4	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	96.5	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	88.9	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	90.9	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.0	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.1	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	94.6	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.1	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 565270) - continued									
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	94.2	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	97.5	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	99.4	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	94.2	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	96.3	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	93.2	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	91.5	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	98.8	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	96.2	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	97.6	80.0	120	----
Total Metals (QCLot: 565291)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	111	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	112	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	110	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	108	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	108	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	101	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	105	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	108	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	108	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	111	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	107	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	106	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	109	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	108	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	109	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	106	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	116	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	109	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	104	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	113	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	109	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	112	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	109	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 565291) - continued									
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	108	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	99.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	115	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	108	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	107	80.0	120	----
Total Metals (QCLot: 565292)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	108	80.0	120	----
Total Metals (QCLot: 569412)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	98.5	80.0	120	----
Dissolved Metals (QCLot: 565735)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Dissolved Metals (QCLot: 565736)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	101	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	99.5	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	99.1	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	95.9	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	99.1	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	99.1	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.3	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	99.2	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.4	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	97.6	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	105	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.5	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	96.6	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 565736) - continued									
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	94.8	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	102	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	99.8	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	101	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	97.3	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 561445)										
CG2209149-012	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0971 mg/L	0.1 mg/L	97.1	75.0	125	----
Anions and Nutrients (QCLot: 562295)										
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0440 mg/L	0.05 mg/L	88.1	70.0	130	----
Anions and Nutrients (QCLot: 562704)										
CG2209105-007	Anonymous	fluoride	16984-48-8	E235.F	0.965 mg/L	1 mg/L	96.5	75.0	125	----
Anions and Nutrients (QCLot: 562705)										
CG2209105-007	Anonymous	chloride	16887-00-6	E235.Cl-L	91.9 mg/L	100 mg/L	91.9	75.0	125	----
Anions and Nutrients (QCLot: 562706)										
CG2209105-007	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.32 mg/L	2.5 mg/L	92.7	75.0	125	----
Anions and Nutrients (QCLot: 562707)										
CG2209105-007	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.454 mg/L	0.5 mg/L	90.7	75.0	125	----
Anions and Nutrients (QCLot: 562709)										
CG2209105-007	Anonymous	bromide	24959-67-9	E235.Br-L	0.457 mg/L	0.5 mg/L	91.3	75.0	125	----
Anions and Nutrients (QCLot: 562710)										
CG2209137-004	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	96.6 mg/L	100 mg/L	96.6	75.0	125	----
Anions and Nutrients (QCLot: 562817)										
CG2209149-006	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0598 mg/L	0.0676 mg/L	88.5	70.0	130	----
Anions and Nutrients (QCLot: 562818)										
CG2209155-003	RG_LILC3_WS_LAEMP_LCO_2022-07_N	phosphorus, total	7723-14-0	E372-U	0.0546 mg/L	0.0676 mg/L	80.7	70.0	130	----
Anions and Nutrients (QCLot: 566816)										
CG2209140-004	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.48 mg/L	2.5 mg/L	99.3	70.0	130	----
Organic / Inorganic Carbon (QCLot: 568728)										
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	carbon, dissolved organic [DOC]	----	E358-L	5.55 mg/L	5 mg/L	111	70.0	130	----
Organic / Inorganic Carbon (QCLot: 568729)										
CG2209155-001	RG_SLINE_WS_LAEMP_LCO_2022-07_N	carbon, total organic [TOC]	----	E355-L	5.82 mg/L	5 mg/L	116	70.0	130	----
Total Metals (QCLot: 565269)										

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: 565269) - continued										
CG2209155-002	RG_LCUT_WS_LAEMP_LCO_2022-07_N	chromium, total	7440-47-3	E420.Cr-L	0.0369 mg/L	0.04 mg/L	92.2	70.0	130	----
Total Metals (QCLot: 565270)										
CG2209155-002	RG_LCUT_WS_LAEMP_LCO_2022-07_N	aluminum, total	7429-90-5	E420	0.190 mg/L	0.2 mg/L	94.8	70.0	130	----
		antimony, total	7440-36-0	E420	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0358 mg/L	0.04 mg/L	89.5	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00899 mg/L	0.01 mg/L	89.9	70.0	130	----
		boron, total	7440-42-8	E420	0.094 mg/L	0.1 mg/L	93.6	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00365 mg/L	0.004 mg/L	91.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0179 mg/L	0.02 mg/L	89.6	70.0	130	----
		copper, total	7440-50-8	E420	0.0175 mg/L	0.02 mg/L	87.7	70.0	130	----
		iron, total	7439-89-6	E420	1.81 mg/L	2 mg/L	90.7	70.0	130	----
		lead, total	7439-92-1	E420	0.0184 mg/L	0.02 mg/L	92.3	70.0	130	----
		lithium, total	7439-93-2	E420	0.0827 mg/L	0.1 mg/L	82.7	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0196 mg/L	0.02 mg/L	98.1	70.0	130	----
		nickel, total	7440-02-0	E420	0.0352 mg/L	0.04 mg/L	88.1	70.0	130	----
		potassium, total	7440-09-7	E420	3.85 mg/L	4 mg/L	96.3	70.0	130	----
		selenium, total	7782-49-2	E420	0.0394 mg/L	0.04 mg/L	98.5	70.0	130	----
		silicon, total	7440-21-3	E420	8.94 mg/L	10 mg/L	89.4	70.0	130	----
		silver, total	7440-22-4	E420	0.00383 mg/L	0.004 mg/L	95.7	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00370 mg/L	0.004 mg/L	92.5	70.0	130	----
		tin, total	7440-31-5	E420	0.0189 mg/L	0.02 mg/L	94.6	70.0	130	----
		titanium, total	7440-32-6	E420	0.0370 mg/L	0.04 mg/L	92.6	70.0	130	----
		uranium, total	7440-61-1	E420	0.00372 mg/L	0.004 mg/L	92.9	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0952 mg/L	0.1 mg/L	95.2	70.0	130	----
		zinc, total	7440-66-6	E420	0.365 mg/L	0.4 mg/L	91.2	70.0	130	----
Total Metals (QCLot: 565291)										
CG2209166-001	Anonymous	aluminum, total	7429-90-5	E420	0.201 mg/L	0.2 mg/L	100	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 565291) - continued										
CG2209166-001	Anonymous	antimony, total	7440-36-0	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0207 mg/L	0.02 mg/L	103	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0382 mg/L	0.04 mg/L	95.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00931 mg/L	0.01 mg/L	93.1	70.0	130	----
		boron, total	7440-42-8	E420	0.092 mg/L	0.1 mg/L	91.6	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		copper, total	7440-50-8	E420	0.0186 mg/L	0.02 mg/L	92.8	70.0	130	----
		iron, total	7439-89-6	E420	1.95 mg/L	2 mg/L	97.5	70.0	130	----
		lead, total	7439-92-1	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		nickel, total	7440-02-0	E420	0.0370 mg/L	0.04 mg/L	92.5	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		selenium, total	7782-49-2	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, total	7440-21-3	E420	9.83 mg/L	10 mg/L	98.3	70.0	130	----
		silver, total	7440-22-4	E420	0.00385 mg/L	0.004 mg/L	96.3	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00379 mg/L	0.004 mg/L	94.8	70.0	130	----
		tin, total	7440-31-5	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		titanium, total	7440-32-6	E420	0.0407 mg/L	0.04 mg/L	102	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.371 mg/L	0.4 mg/L	92.7	70.0	130	----
Total Metals (QCLot: 565292)										
CG2209166-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0394 mg/L	0.04 mg/L	98.5	70.0	130	----
Total Metals (QCLot: 569412)										
CG2209154-009	Anonymous	mercury, total	7439-97-6	E508	0.0000957 mg/L	0.0001 mg/L	95.7	70.0	130	----
Dissolved Metals (QCLot: 565735)										

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: 565735) - continued										
CG2209155-002	RG_LCUT_WS_LAEMP_LCO_2022-07_N	chromium, dissolved	7440-47-3	E421.Cr-L	0.0398 mg/L	0.04 mg/L	99.6	70.0	130	----
Dissolved Metals (QCLot: 565736)										
CG2209155-002	RG_LCUT_WS_LAEMP_LCO_2022-07_N	aluminum, dissolved	7429-90-5	E421	0.205 mg/L	0.2 mg/L	102	70.0	130	----
CG2209155-002	RG_LCUT_WS_LAEMP_LCO_2022-07_N	antimony, dissolved	7440-36-0	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0383 mg/L	0.04 mg/L	95.7	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00834 mg/L	0.01 mg/L	83.4	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.095 mg/L	0.1 mg/L	94.9	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00398 mg/L	0.004 mg/L	99.4	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0188 mg/L	0.02 mg/L	93.8	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.93 mg/L	2 mg/L	96.4	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0905 mg/L	0.1 mg/L	90.5	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0213 mg/L	0.02 mg/L	107	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0376 mg/L	0.04 mg/L	93.9	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.56 mg/L	4 mg/L	89.0	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
		silicon, dissolved	7440-21-3	E421	8.81 mg/L	10 mg/L	88.1	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00399 mg/L	0.004 mg/L	99.7	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00370 mg/L	0.004 mg/L	92.5	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0387 mg/L	0.04 mg/L	96.9	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00380 mg/L	0.004 mg/L	94.9	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0995 mg/L	0.1 mg/L	99.5	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.389 mg/L	0.4 mg/L	97.3	70.0	130	----
Dissolved Metals (QCLot: 569406)										
CG2209154-009	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000968 mg/L	0.0001 mg/L	96.8	70.0	130	----

Teck

Environmental Division Calgary
Work Order Reference
CG2209155

COC ID:	REP_LAEMP_LCO_2022_JULY_ALS	TURNAROUND TIME:	Regular	RUSH:	N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1:	aquascilab@teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	2559 29 Street NE			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	Jessica.Ritz@Teck.com	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Tyler.Mehler@Minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6:	lbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	403 407 1794			PO number	VPO00816101			

Environmental Division Calgary
Work Order Reference
CG2209155

Telephone : +1 403 407 1800

SAMPLE DETAILS / ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: N)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Fil.	F	N	F	N	F	N	N					
								PRESERV.	H2SO4	H2SO4	HCL	NONE	HNO3	HNO3	NONE					
								ANALYSIS	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	HG-T-U-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-METNHG-T-CL	TECKCOAL-ROUTINE-VA					
RG_SLINE_WS_LAEMP_LCO_2022-07-N	RG_SLINE	WS	NO	2022-07-12	14:00	G	7		X	X	X	X	X	X	X					
RG_LCUT_WS_LAEMP_LCO_2022-07-N	RG_LCUT	WS	NO	2022-07-12	09:30	G	7		X	X	X	X	X	X	X					
RG_LICS_WS_LAEMP_LCO_2022-07-N	RG_LCUT	WS	NO	2022-07-12	11:45	G	7		X	X	X	X	X	X	X					
RG_RIVER_WS_LAEMP_LCO_2022-07-N	RG_RIVER	WS	NO	2022-07-12	11:00	G	7		X	X	X	X	X	X	X					
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Rich Smith / Lotic environmental	2022-07-12/14:30		7/13/2022

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Rich Smith	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge		Sampler's Signature		Date/Time	2022-07-12 / 16:30
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

10 C

Environmental Division Calgary
Work Order Reference
CG2209155

WATER CHEMISTRY

ALS Laboratory Report CG2212408
(Finalized September 15, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2212408**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B2G0	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 13-Sep-2022 09:11
PO	: VPO00816101	Date Analysis Commenced	: 13-Sep-2022
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS	Issue Date	: 15-Sep-2022 15:27
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Baxter		Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta
Sonthuong Bui	Laboratory Analyst	Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
HTA	*Analytical holding time was exceeded.*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_FRUL_WS_LAEMP_LCO_2022-09_N	----	----	----	----
					Client sampling date / time: 10-Sep-2022 08:45	----	----	----	----
					CG2212408-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	----	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	193	----	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	235	----	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	7.2	----	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	4.3	----	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	200	----	----	----	----
conductivity	----	E100	2.0	µS/cm	741	----	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	404	----	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV	331	----	----	----	----
pH	----	E108	0.10	pH units	8.38	----	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	562	----	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	<1.0	----	----	----	----
turbidity	----	E121	0.10	NTU	0.11 HTA	----	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	----	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	----	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	2.64	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.185	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.505 TKNI	----	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	11.2	----	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0039	----	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010 HTA	----	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	----	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	192	----	----	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	----	----	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_FRUL_WS_LAEMP_LCO_2022-09_N	----	----	----	----
					Client sampling date / time: 10-Sep-2022 08:45	----	----	----	----
					CG2212408-001	--------	--------	--------	--------
					Result	----	----	----	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	8.88	----	----	----	----
cation sum	----	EC101	0.10	meq/L	8.22	----	----	----	----
ion balance (cations/anions)	----	EC101	0.010	%	92.6	----	----	----	----
ion balance (APHA)	----	EC101	0.010	%	3.86	----	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0038	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00010	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00011	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.114	----	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	----	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.0109	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	96.3	----	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00012	----	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	<0.010	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	0.000067	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0292	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	45.6	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00061	----	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00125	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00064	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	1.26	----	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L	46.0	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	2.34	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	----	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L	2.81	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_FRUL_WS_LAEMP_LCO_2022-09_N	----	----	----	----
					Client sampling date / time: 10-Sep-2022 08:45	----	----	----	----
					CG2212408-001	--------	--------	--------	--------
					Result	----	----	----	----
Total Metals									
strontium, total	7440-24-6	E420	0.00020	mg/L	0.153	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	68.2	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00218	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	----	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00011	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.100	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.010	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.0069	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	91.9	----	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L	<0.10	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0256	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	42.3	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00031	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00120	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00055	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.32	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_FRUL_WS_LAEMP_LCO_2022-09_N	----	----	----	----
					Client sampling date / time: 10-Sep-2022 08:45	----	----	----	----
					CG2212408-001	--------	--------	--------	--------
					Result	----	----	----	----
Dissolved Metals									
selenium, dissolved	7782-49-2	E421	0.050	µg/L	56.8	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.40	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	2.85	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.154	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	66.8	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00227	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2212408**	Page	: 1 of 12
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B2G0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 13-Sep-2022 09:11
PO	: VPO00816101	Issue Date	: 15-Sep-2022 15:27
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS		
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E298	10-Sep-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E235.Br-L	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E235.Cl-L	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E378-U	10-Sep-2022	13-Sep-2022	----	----		13-Sep-2022	3 days	3 days	× EHTL
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E235.F	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E235.NO3-L	10-Sep-2022	14-Sep-2022	3 days	4 days	× EHTL	14-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E235.NO2-L	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	3 days	4 days	× EHTL

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E235.SO4	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E318	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E372-U	10-Sep-2022	14-Sep-2022	----	----		15-Sep-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E421.Cr-L	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E509	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E421	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	180 days	4 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E358-L	10-Sep-2022	13-Sep-2022	----	----		14-Sep-2022	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E355-L	10-Sep-2022	13-Sep-2022	----	----		14-Sep-2022	28 days	3 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E283	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	14 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-09_N	E290	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	14 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-09_N	E100	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	28 days	4 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-09_N	E125	10-Sep-2022	----	----	----		14-Sep-2022	0.25 hrs	99 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-09_N	E108	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-09_N	E162	10-Sep-2022	----	----	----		14-Sep-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-09_N	E160-L	10-Sep-2022	----	----	----		14-Sep-2022	7 days	4 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_FRUL_WS_LAEMP_LCO_2022-09_N	E121	10-Sep-2022	----	----	----		13-Sep-2022	3 days	3 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_FRUL_WS_LAEMP_LCO_2022-09_N	E420.Cr-L	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	180 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_FRUL_WS_LAEMP_LCO_2022-09_N	E508	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	28 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_FRUL_WS_LAEMP_LCO_2022-09_N	E420	10-Sep-2022	14-Sep-2022	----	----		14-Sep-2022	180 days	4 days	✓

Legend & Qualifier Definitions

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

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

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	646040	1	9	11.1	5.0	✓
Alkalinity Species by Titration	E290	646035	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	645526	1	9	11.1	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	645945	1	3	33.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	645946	1	3	33.3	5.0	✓
Conductivity in Water	E100	646037	1	5	20.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	646741	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	647532	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	646742	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	645441	1	9	11.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	645469	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	645942	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	645947	1	3	33.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	645948	1	3	33.3	5.0	✓
ORP by Electrode	E125	646219	1	9	11.1	5.0	✓
pH by Meter	E108	646036	1	5	20.0	5.0	✓
Sulfate in Water by IC	E235.SO4	645941	1	15	6.6	5.0	✓
TDS by Gravimetry	E162	647154	1	11	9.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	646084	1	5	20.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	645448	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	647531	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	646083	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	645442	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	646476	1	9	11.1	5.0	✓
Turbidity by Nephelometry	E121	645422	1	3	33.3	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	646040	1	9	11.1	5.0	✓
Alkalinity Species by Titration	E290	646035	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	645526	1	9	11.1	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	645945	1	3	33.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	645946	1	3	33.3	5.0	✓
Conductivity in Water	E100	646037	1	5	20.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	646741	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	647532	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	646742	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	645441	1	9	11.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	645469	1	3	33.3	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	645942	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	645947	1	3	33.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	645948	1	3	33.3	5.0	✓
ORP by Electrode	E125	646219	1	9	11.1	5.0	✓
pH by Meter	E108	646036	1	5	20.0	5.0	✓
Sulfate in Water by IC	E235.SO4	645941	1	15	6.6	5.0	✓
TDS by Gravimetry	E162	647154	1	11	9.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	646084	1	5	20.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	645448	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	647531	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	646083	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	645442	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	646476	1	9	11.1	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	647137	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	645422	1	3	33.3	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	646040	1	9	11.1	5.0	✓
Alkalinity Species by Titration	E290	646035	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	645526	1	9	11.1	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	645945	1	3	33.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	645946	1	3	33.3	5.0	✓
Conductivity in Water	E100	646037	1	5	20.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	646741	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	647532	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	646742	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	645441	1	9	11.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	645469	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	645942	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	645947	1	3	33.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	645948	1	3	33.3	5.0	✓
Sulfate in Water by IC	E235.SO4	645941	1	15	6.6	5.0	✓
TDS by Gravimetry	E162	647154	1	11	9.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	646084	1	5	20.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	645448	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	647531	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	646083	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	645442	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	646476	1	9	11.1	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	647137	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	645422	1	3	33.3	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	645526	1	9	11.1	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	645945	1	3	33.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	645946	1	3	33.3	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	646741	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	647532	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	646742	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	645441	1	9	11.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	645469	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	645942	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	645947	1	3	33.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	645948	1	3	33.3	5.0	✓
Sulfate in Water by IC	E235.SO4	645941	1	15	6.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	646084	1	5	20.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	645448	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	647531	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	646083	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	645442	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	646476	1	9	11.1	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 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Calgary - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2212408**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B2G0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 13-Sep-2022 09:11
PO	: VPO00816101	Date Analysis Commenced	: 13-Sep-2022
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS	Issue Date	: 15-Sep-2022 15:27
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Kevin Baxter		Calgary Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Calgary Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Calgary Inorganics, Calgary, Alberta
Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Sara Niroomand		Calgary Metals, Calgary, Alberta
Sonthuong Bui	Laboratory Analyst	Calgary Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Calgary Inorganics, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 645422)											
CG2212408-001	RG_FRUL_WS_LAEMP_LCO_2022-09_N	turbidity	----	E121	0.10	NTU	0.11	0.11	0.001	Diff <2x LOR	----
Physical Tests (QC Lot: 646035)											
CG2212400-003	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	575	594	3.33%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	575	594	3.33%	20%	----
Physical Tests (QC Lot: 646036)											
CG2212407-001	Anonymous	pH	----	E108	0.10	pH units	8.38	8.38	0.00%	4%	----
Physical Tests (QC Lot: 646037)											
CG2212407-001	Anonymous	conductivity	----	E100	2.0	µS/cm	769	762	0.914%	10%	----
Physical Tests (QC Lot: 646040)											
CG2212395-001	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 646219)											
CG2212395-001	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	313	315	0.541%	15%	----
Physical Tests (QC Lot: 647154)											
CG2212395-001	Anonymous	solids, total dissolved [TDS]	----	E162	40	mg/L	529	542	2.43%	20%	----
Anions and Nutrients (QC Lot: 645448)											
CG2212395-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 645469)											
CG2212408-001	RG_FRUL_WS_LAEMP_LCO_2022-09_N	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 645526)											
CG2212395-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 645941)											
CG2212394-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	489	487	0.390%	20%	----
Anions and Nutrients (QC Lot: 645942)											
CG2212394-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.181	0.185	0.004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 645945)											
CG2212408-001	RG_FRUL_WS_LAEMP_LCO_2022-09_N	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 645946)											

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: 645946) - continued											
CG2212408-001	RG_FRUL_WS_LAEMP_LCO_2022-09_N	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	2.64	2.64	0.121%	20%	----
Anions and Nutrients (QC Lot: 645947)											
CG2212408-001	RG_FRUL_WS_LAEMP_LCO_2022-09_N	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	11.2	11.2	0.127%	20%	----
Anions and Nutrients (QC Lot: 645948)											
CG2212408-001	RG_FRUL_WS_LAEMP_LCO_2022-09_N	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0039	0.0038	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 646476)											
CG2212395-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0071	0.0072	0.00009	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 645441)											
CG2212395-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 645442)											
CG2212395-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 646083)											
CG2212407-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0046	0.0048	0.0002	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00011	0.00010	0.000007	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	0.00012	0.00002	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.109	0.108	1.48%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.011	0.010	0.0001	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0284 µg/L	0.0000292	0.0000008	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	97.2	98.5	1.30%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0322	0.0312	3.20%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	45.2	44.6	1.36%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00160	0.00147	8.14%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00128	0.00128	0.270%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00096	0.00088	0.00008	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.30	1.28	1.35%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	50.0 µg/L	0.0474	5.39%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.17	2.15	0.874%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	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: 646083) - continued											
CG2212407-001	Anonymous	sodium, total	7440-23-5	E420	0.050	mg/L	2.80	2.79	0.0809%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.145	0.145	0.295%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	68.2	68.4	0.334%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00220	0.00216	2.03%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Total Metals (QC Lot: 646084)											
CG2212407-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00012	0.00016	0.00003	Diff <2x LOR	----
Total Metals (QC Lot: 647531)											
CG2212395-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 646741)											
CG2212207-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 646742)											
CG2212207-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00065	0.00067	0.00002	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00010	<0.00010	0.000003	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0502	0.0508	1.31%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.031	0.032	0.0007	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0869 µg/L	0.0000969	10.9%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	223	228	2.24%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.306	0.305	0.501%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	125	128	2.52%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00044	0.00048	0.00005	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00269	0.00280	3.97%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00659	0.00652	1.04%	20%	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	6.59	6.77	2.82%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 646742) - continued											
CG2212207-001	Anonymous	selenium, dissolved	7782-49-2	E421	0.000050	mg/L	128 µg/L	0.135	5.63%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.60	2.66	2.27%	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	10.8	11.1	2.46%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.381	0.392	2.84%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	179	188	4.75%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.0113	0.0116	2.59%	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	0.0031	0.0032	0.00007	Diff <2x LOR	----
Dissolved Metals (QC Lot: 647532)											
CG2212395-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 645422)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 646035)						
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: 646037)						
conductivity	----	E100	1	µS/cm	1.2	----
Physical Tests (QCLot: 646040)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 647137)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 647154)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 645448)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 645469)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 645526)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 645941)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 645942)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 645945)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 645946)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 645947)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 645948)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 646476)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 646476) - continued						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 645441)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 645442)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 646083)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 646083) - continued						
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 646084)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 647531)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 646741)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 646742)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 646742) - continued						
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	----
Dissolved Metals (QCLot: 647532)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 645422)									
turbidity	----	E121	0.1	NTU	200 NTU	106	85.0	115	----
Physical Tests (QCLot: 646035)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 646036)									
pH	----	E108	----	pH units	7 pH units	101	98.6	101	----
Physical Tests (QCLot: 646037)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	96.9	90.0	110	----
Physical Tests (QCLot: 646040)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	104	85.0	115	----
Physical Tests (QCLot: 646219)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	102	95.4	104	----
Physical Tests (QCLot: 647137)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	99.8	85.0	115	----
Physical Tests (QCLot: 647154)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	99.0	85.0	115	----
Anions and Nutrients (QCLot: 645448)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	99.6	75.0	125	----
Anions and Nutrients (QCLot: 645469)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	96.8	80.0	120	----
Anions and Nutrients (QCLot: 645526)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.4	85.0	115	----
Anions and Nutrients (QCLot: 645941)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 645942)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 645945)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 645946)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 645947)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 645948)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 645948) - continued									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 646476)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	94.4	80.0	120	----
Organic / Inorganic Carbon (QCLot: 645441)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 645442)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Total Metals (QCLot: 646083)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	98.5	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	95.8	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	93.0	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	96.0	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	95.5	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	92.3	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	94.6	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	93.0	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	93.9	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	93.0	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	104	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	96.2	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	96.5	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	93.9	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	97.2	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	90.8	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	83.2	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	98.3	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	95.7	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	93.9	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	97.8	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	96.1	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 646083) - continued									
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	91.7	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	91.5	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	94.1	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	91.0	80.0	120	----
Total Metals (QCLot: 646084)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	95.9	80.0	120	----
Total Metals (QCLot: 647531)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	100	80.0	120	----
Dissolved Metals (QCLot: 646741)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	99.0	80.0	120	----
Dissolved Metals (QCLot: 646742)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	103	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.1	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	99.7	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	106	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.2	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	98.6	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.8	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	95.4	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.0	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.5	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	108	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.7	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	91.7	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	94.9	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	96.4	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.5	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	94.7	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	99.2	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	90.2	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	100	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	89.0	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	99.7	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	99.0	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 646742) - continued									
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.4	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.2	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	98.8	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	96.2	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.8	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	103	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	104	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: 645448)										
CG2212395-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.54 mg/L	2.5 mg/L	101	70.0	130	----
Anions and Nutrients (QCLot: 645469)										
CG2212409-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0462 mg/L	0.05 mg/L	92.4	70.0	130	----
Anions and Nutrients (QCLot: 645526)										
CG2212395-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.109 mg/L	0.1 mg/L	109	75.0	125	----
Anions and Nutrients (QCLot: 645941)										
CG2212394-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 645942)										
CG2212394-002	Anonymous	fluoride	16984-48-8	E235.F	1.04 mg/L	1 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 645945)										
CG2212409-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.486 mg/L	0.5 mg/L	97.3	75.0	125	----
Anions and Nutrients (QCLot: 645946)										
CG2212409-001	Anonymous	chloride	16887-00-6	E235.Cl-L	97.9 mg/L	100 mg/L	97.9	75.0	125	----
Anions and Nutrients (QCLot: 645947)										
CG2212409-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 645948)										
CG2212409-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.499 mg/L	0.5 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 646476)										
CG2212395-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0472 mg/L	0.05 mg/L	94.4	70.0	130	----
Organic / Inorganic Carbon (QCLot: 645441)										
CG2212395-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	5.72 mg/L	5 mg/L	114	70.0	130	----
Organic / Inorganic Carbon (QCLot: 645442)										
CG2212395-001	Anonymous	carbon, total organic [TOC]	----	E355-L	5.80 mg/L	5 mg/L	116	70.0	130	----
Total Metals (QCLot: 646083)										
CG2212407-001	Anonymous	aluminum, total	7429-90-5	E420	1.92 mg/L	2 mg/L	96.3	70.0	130	----
		antimony, total	7440-36-0	E420	0.186 mg/L	0.2 mg/L	93.2	70.0	130	----
		arsenic, total	7440-38-2	E420	0.190 mg/L	0.2 mg/L	94.8	70.0	130	----
		barium, total	7440-39-3	E420	0.178 mg/L	0.2 mg/L	88.8	70.0	130	----
		beryllium, total	7440-41-7	E420	0.373 mg/L	0.4 mg/L	93.2	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 646083) - continued										
CG2212407-001	Anonymous	bismuth, total	7440-69-9	E420	0.0998 mg/L	0.1 mg/L	99.8	70.0	130	----
		boron, total	7440-42-8	E420	0.899 mg/L	1 mg/L	89.9	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.192 mg/L	0.2 mg/L	95.8	70.0	130	----
		copper, total	7440-50-8	E420	0.194 mg/L	0.2 mg/L	97.0	70.0	130	----
		iron, total	7439-89-6	E420	19.1 mg/L	20 mg/L	95.4	70.0	130	----
		lead, total	7439-92-1	E420	0.203 mg/L	0.2 mg/L	102	70.0	130	----
		lithium, total	7439-93-2	E420	0.934 mg/L	1 mg/L	93.4	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.194 mg/L	0.2 mg/L	96.9	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.199 mg/L	0.2 mg/L	99.5	70.0	130	----
		nickel, total	7440-02-0	E420	0.384 mg/L	0.4 mg/L	96.0	70.0	130	----
		potassium, total	7440-09-7	E420	38.3 mg/L	40 mg/L	95.8	70.0	130	----
		selenium, total	7782-49-2	E420	0.388 mg/L	0.4 mg/L	97.0	70.0	130	----
		silicon, total	7440-21-3	E420	102 mg/L	100 mg/L	102	70.0	130	----
		silver, total	7440-22-4	E420	0.0384 mg/L	0.04 mg/L	96.1	70.0	130	----
		sodium, total	7440-23-5	E420	19.6 mg/L	20 mg/L	97.9	70.0	130	----
		strontium, total	7440-24-6	E420	0.197 mg/L	0.2 mg/L	98.5	70.0	130	----
		sulfur, total	7704-34-9	E420	174 mg/L	200 mg/L	87.0	70.0	130	----
		thallium, total	7440-28-0	E420	0.0361 mg/L	0.04 mg/L	90.2	70.0	130	----
		tin, total	7440-31-5	E420	0.184 mg/L	0.2 mg/L	91.9	70.0	130	----
		titanium, total	7440-32-6	E420	0.378 mg/L	0.4 mg/L	94.4	70.0	130	----
		uranium, total	7440-61-1	E420	0.0373 mg/L	0.04 mg/L	93.3	70.0	130	----
		vanadium, total	7440-62-2	E420	0.954 mg/L	1 mg/L	95.4	70.0	130	----
		zinc, total	7440-66-6	E420	3.84 mg/L	4 mg/L	95.9	70.0	130	----
Total Metals (QCLot: 646084)										
CG2212407-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.392 mg/L	0.4 mg/L	98.1	70.0	130	----
Total Metals (QCLot: 647531)										
CG2212395-002	Anonymous	mercury, total	7439-97-6	E508	0.000103 mg/L	0.0001 mg/L	103	70.0	130	----
Dissolved Metals (QCLot: 646741)										
CG2212207-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.451 mg/L	0.4 mg/L	113	70.0	130	----
Dissolved Metals (QCLot: 646742)										
CG2212207-002	Anonymous	aluminum, dissolved	7429-90-5	E421	2.29 mg/L	2 mg/L	114	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.219 mg/L	0.2 mg/L	109	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: 646742) - continued										
CG2212207-002	Anonymous	arsenic, dissolved	7440-38-2	E421	0.213 mg/L	0.2 mg/L	106	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.148 mg/L	0.2 mg/L	74.3	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.439 mg/L	0.4 mg/L	110	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.111 mg/L	0.1 mg/L	111	70.0	130	----
		boron, dissolved	7440-42-8	E421	1.05 mg/L	1 mg/L	105	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0445 mg/L	0.04 mg/L	111	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.216 mg/L	0.2 mg/L	108	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.220 mg/L	0.2 mg/L	110	70.0	130	----
		iron, dissolved	7439-89-6	E421	21.2 mg/L	20 mg/L	106	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.225 mg/L	0.2 mg/L	112	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.956 mg/L	1 mg/L	95.6	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.222 mg/L	0.2 mg/L	111	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.217 mg/L	0.2 mg/L	108	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.433 mg/L	0.4 mg/L	108	70.0	130	----
		potassium, dissolved	7440-09-7	E421	40.9 mg/L	40 mg/L	102	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.362 mg/L	0.4 mg/L	90.6	70.0	130	----
		silicon, dissolved	7440-21-3	E421	82.1 mg/L	100 mg/L	82.1	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0463 mg/L	0.04 mg/L	116	70.0	130	----
		sodium, dissolved	7440-23-5	E421	20.3 mg/L	20 mg/L	101	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.238 mg/L	0.2 mg/L	119	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	141 mg/L	200 mg/L	70.4	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0425 mg/L	0.04 mg/L	106	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.222 mg/L	0.2 mg/L	111	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.451 mg/L	0.4 mg/L	113	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	1.08 mg/L	1 mg/L	108	70.0	130	----
		zinc, dissolved	7440-66-6	E421	4.76 mg/L	4 mg/L	119	70.0	130	----
Dissolved Metals (QCLot: 647532)										
CG2212395-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.000100 mg/L	0.0001 mg/L	100	70.0	130	----

Teck

COC ID:	REP_LAEMP_LCO_2022-09_ALS	TURNAROUND TIME:	2-3 Business Days	RUSH:	Priorty

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1:	AquaSciLab@Teck.com	X	X	X
Email	Cybele.Heddle@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	Lisa.Bowron@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Tyler.Mehler@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6:	Hannah.Penner@Teck.com	X	X	X
Phone Number	1-250-865-3048			Phone Number	403 407 1794			PO number		VPO00816101		

Environmental Division
Calgary
Work Order Reference
CG2212408

Telephone : +1 403 407 1800

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Filt.	F	F	N	F	N	N	N				
								PRESERV.	H2SO4	HCL	HCL				H2SO4				
								ANALYSIS	DOC	Mercury_Dissolved	Mercury_Total	TECKCOAL_METNHG_D	TECKCOAL_METNHG_T	TECKCOAL_ROUTINE	TOC_TKN_PT				
RG_FRUL_WS_LAEMP_LCO_2022-09_N	RG_FRUL	WS		2022/09/10	8:45	G	7		1	1	1	1	1	1	1				

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Dissolved metals were field filtered and to be lab preserved Total metals to be lab preserved	Jennifer Ings/Minnow	##########	TC	13 09 22 0911

SERVICE REQUEST (rush - subject to availability)

Regular (default)	
Priority (2-3 business days) - 50% surcharge	X
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	5195003444
Sampler's Signature		Date/Time	September 12, 2022

10 °C

WATER CHEMISTRY

ALS Laboratory Report CG2212276
(Finalized September 15, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2212276**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECT PROGRAM	Date Samples Received	: 10-Sep-2022 11:45
PO	: VPO00816101	Date Analysis Commenced	: 11-Sep-2022
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS	Issue Date	: 15-Sep-2022 16:03
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_FO23_WS_LAEMP_LCO_2022-09_N	Client sample ID: RG_LILC3_WS_LAEMP_LCO_2022-08_N	Client sample ID: ----	Client sample ID: ----	Client sample ID: ----
					Client sampling date / time: 09-Sep-2022 08:05	Client sampling date / time: 08-Sep-2022 09:30	----	----	----
					CG2212276-001	CG2212276-002	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	186	230	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	226	281	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	11.0	<1.0	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	6.6	<1.0	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	197	230	----	----	----
conductivity	----	E100	2.0	µS/cm	709	968	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	413	561	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV	240	244	----	----	----
pH	----	E108	0.10	pH units	8.41	8.16	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	499	712	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	1.3	<1.0	----	----	----
turbidity	----	E121	0.10	NTU	0.22	0.20	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.250 DLDS	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	4.22	14.8	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.208	0.207	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.126 TKNI	<0.500 DLM, TKNI	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	9.54	10.8	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0029	<0.0050 DLDS	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0025	0.0035	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	189	316	----	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.63	0.56	----	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.68	0.68	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FO23_WS_LAEMP_LCO_2022-09_N	RG_LILC3_WS_LAEMP_LCO_2022-08_N	----	----	----
					Client sampling date / time	09-Sep-2022 08:05	08-Sep-2022 09:30	----	----	----
						CG2212276-001	CG2212276-002	--------	--------	--------
						Result	Result	----	----	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		8.68	12.4	----	----	----
cation sum	----	EC101	0.10	meq/L		8.43	11.7	----	----	----
ion balance (cations/anions)	----	EC101	0.010	%		97.1	94.4	----	----	----
ion balance (APHA)	----	EC101	0.010	%		1.46	2.90	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0053	0.0052	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00014	0.00031	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00015	0.00016	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0916	0.0561	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L		<0.020	<0.020	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.011	0.018	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L		0.0333	0.372	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		97.4	128	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00018	0.00014	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L		<0.10	0.10	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.010	0.022	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0293	0.0587	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		41.6	59.8	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00057	0.0115	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00140	0.00284	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00142	0.00992	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		1.28	1.74	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L		40.9	49.3	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.55	2.56	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		3.66	9.74	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FO23_WS_LAEMP_LCO_2022-09_N	RG_LILC3_WS_LAEMP_LCO_2022-08_N	----	----	----
					Client sampling date / time	09-Sep-2022 08:05	08-Sep-2022 09:30	----	----	----
						CG2212276-001	CG2212276-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
strontium, total	7440-24-6	E420	0.00020	mg/L		0.174	0.233	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		76.3	114	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	0.000014	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00224	0.00400	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00057	0.00054	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	0.0154	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		<0.0010	0.0011	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00012	0.00029	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0959	0.0561	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	<0.020	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.011	0.019	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.0230	0.356	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		95.7	123	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		0.00011	0.00012	----	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L		<0.10	<0.10	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00020	0.00026	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	<0.010	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0277	0.0590	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		42.2	61.7	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00033	0.0116	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00139	0.00285	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00132	0.00936	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.18	1.65	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FO23_WS_LAEMP_LCO_2022-09_N	RG_LILC3_WS_LAEMP_LCO_2022-08_N	----	----	----
					Client sampling date / time	09-Sep-2022 08:05	08-Sep-2022 09:30	----	----	----
						CG2212276-001	CG2212276-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
selenium, dissolved	7782-49-2	E421	0.050	µg/L		49.7	60.0	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.41	2.40	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		3.65	9.57	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.164	0.217	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		70.5	112	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	0.000013	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00216	0.00395	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0012	0.0141	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2212276**	Page	: 1 of 15
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECT PROGRAM	Date Samples Received	: 10-Sep-2022 11:45
PO	: VPO00816101	Issue Date	: 15-Sep-2022 16:04
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS		
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_FO23_WS_LAEMP_LCO_2022-09_N	E298	09-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LILC3_WS_LAEMP_LCO_2022-08_N	E298	08-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_FO23_WS_LAEMP_LCO_2022-09_N	E235.Br-L	09-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-08_N	E235.Br-L	08-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
RG_FO23_WS_LAEMP_LCO_2022-09_N	E235.Cl-L	09-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-08_N	E235.Cl-L	08-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE										
RG_FO23_WS_LAEMP_LCO_2022-09_N	E378-U	09-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-08_N	E378-U	08-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_FO23_WS_LAEMP_LCO_2022-09_N	E235.F	09-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-08_N	E235.F	08-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_FO23_WS_LAEMP_LCO_2022-09_N	E235.NO3-L	09-Sep-2022	11-Sep-2022	3 days	2 days	✓	11-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-08_N	E235.NO3-L	08-Sep-2022	11-Sep-2022	3 days	3 days	✓	11-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_FO23_WS_LAEMP_LCO_2022-09_N	E235.NO2-L	09-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-08_N	E235.NO2-L	08-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_FO23_WS_LAEMP_LCO_2022-09_N	E235.SO4	09-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-08_N	E235.SO4	08-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_FO23_WS_LAEMP_LCO_2022-09_N	E318	09-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_LILC3_WS_LAEMP_LCO_2022-08_N	E318	08-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) RG_FO23_WS_LAEMP_LCO_2022-09_N	E372-U	09-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) RG_LILC3_WS_LAEMP_LCO_2022-08_N	E372-U	08-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) RG_FO23_WS_LAEMP_LCO_2022-09_N	E421.Cr-L	09-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) RG_LILC3_WS_LAEMP_LCO_2022-08_N	E421.Cr-L	08-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_FO23_WS_LAEMP_LCO_2022-09_N	E509	09-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LILC3_WS_LAEMP_LCO_2022-08_N	E509	08-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_FO23_WS_LAEMP_LCO_2022-09_N	E421	09-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	180 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
RG_LILC3_WS_LAEMP_LCO_2022-08_N	E421	08-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	180 days	5 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_FO23_WS_LAEMP_LCO_2022-09_N	E358-L	09-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	2 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_LILC3_WS_LAEMP_LCO_2022-08_N	E358-L	08-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_FO23_WS_LAEMP_LCO_2022-09_N	E355-L	09-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_LILC3_WS_LAEMP_LCO_2022-08_N	E355-L	08-Sep-2022	11-Sep-2022	----	----		11-Sep-2022	28 days	3 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_FO23_WS_LAEMP_LCO_2022-09_N	E283	09-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	14 days	3 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-08_N	E283	08-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_FO23_WS_LAEMP_LCO_2022-09_N	E290	09-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-08_N	E290	08-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	14 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE RG_FO23_WS_LAEMP_LCO_2022-09_N	E100	09-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-08_N	E100	08-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	4 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_FO23_WS_LAEMP_LCO_2022-09_N	E125	09-Sep-2022	----	----	----		12-Sep-2022	0.25 hrs	76 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-08_N	E125	08-Sep-2022	----	----	----		12-Sep-2022	0.25 hrs	99 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_FO23_WS_LAEMP_LCO_2022-09_N	E108	09-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-08_N	E108	08-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_FO23_WS_LAEMP_LCO_2022-09_N	E162	09-Sep-2022	----	----	----		13-Sep-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-08_N	E162	08-Sep-2022	----	----	----		13-Sep-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_FO23_WS_LAEMP_LCO_2022-09_N	E160-L	09-Sep-2022	----	----	----		13-Sep-2022	7 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-08_N	E160-L	08-Sep-2022	----	----	----		13-Sep-2022	7 days	5 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_FO23_WS_LAEMP_LCO_2022-09_N	E121	09-Sep-2022	----	----	----		11-Sep-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-08_N	E121	08-Sep-2022	----	----	----		11-Sep-2022	3 days	3 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_FO23_WS_LAEMP_LCO_2022-09_N	E420.Cr-L	09-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_LILC3_WS_LAEMP_LCO_2022-08_N	E420.Cr-L	08-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	180 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_FO23_WS_LAEMP_LCO_2022-09_N	E508	09-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LILC3_WS_LAEMP_LCO_2022-08_N	E508	08-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) RG_FO23_WS_LAEMP_LCO_2022-09_N	E420	09-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) RG_LILC3_WS_LAEMP_LCO_2022-08_N	E420	08-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	180 days	5 days	✓

Legend & Qualifier Definitions

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

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	642501	1	17	5.8	5.0	✓
Alkalinity Species by Titration	E290	642497	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	641825	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	641957	1	15	6.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	641958	1	15	6.6	5.0	✓
Conductivity in Water	E100	642496	1	17	5.8	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	643704	1	16	6.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	642719	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	643705	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	641869	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	641921	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	641956	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	641959	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	641960	1	19	5.2	5.0	✓
ORP by Electrode	E125	641962	1	15	6.6	5.0	✓
pH by Meter	E108	642495	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	641961	1	15	6.6	5.0	✓
TDS by Gravimetry	E162	645182	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	643302	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642132	1	15	6.6	5.0	✓
Total Mercury in Water by CVAAS	E508	642722	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	643301	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	641870	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642658	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	641757	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	642501	1	17	5.8	5.0	✓
Alkalinity Species by Titration	E290	642497	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	641825	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	641957	1	15	6.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	641958	1	15	6.6	5.0	✓
Conductivity in Water	E100	642496	1	17	5.8	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	643704	1	16	6.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	642719	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	643705	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	641869	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	641921	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	641956	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	641959	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	641960	1	19	5.2	5.0	✓
ORP by Electrode	E125	641962	1	15	6.6	5.0	✓
pH by Meter	E108	642495	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	641961	1	15	6.6	5.0	✓
TDS by Gravimetry	E162	645182	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	643302	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642132	1	15	6.6	5.0	✓
Total Mercury in Water by CVAAS	E508	642722	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	643301	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	641870	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642658	1	17	5.8	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	645179	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	641757	1	17	5.8	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	642501	1	17	5.8	5.0	✓
Alkalinity Species by Titration	E290	642497	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	641825	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	641957	1	15	6.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	641958	1	15	6.6	5.0	✓
Conductivity in Water	E100	642496	1	17	5.8	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	643704	1	16	6.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	642719	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	643705	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	641869	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	641921	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	641956	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	641959	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	641960	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	641961	1	15	6.6	5.0	✓
TDS by Gravimetry	E162	645182	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	643302	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642132	1	15	6.6	5.0	✓
Total Mercury in Water by CVAAS	E508	642722	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	643301	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	641870	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642658	1	17	5.8	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	645179	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	641757	1	17	5.8	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	641825	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	641957	1	15	6.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	641958	1	15	6.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	643704	1	16	6.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	642719	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	643705	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	641869	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	641921	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	641956	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	641959	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	641960	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	641961	1	15	6.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	643302	1	16	6.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642132	1	15	6.6	5.0	✓
Total Mercury in Water by CVAAS	E508	642722	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	643301	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	641870	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642658	1	17	5.8	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Calgary - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2212276**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECT PROGRAM	Date Samples Received	: 10-Sep-2022 11:45
PO	: VPO00816101	Date Analysis Commenced	: 11-Sep-2022
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS	Issue Date	: 15-Sep-2022 16:04
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Calgary Inorganics, Calgary, Alberta
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Elke Tabora		Calgary Inorganics, Calgary, Alberta
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Harpreet Chawla	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Calgary Metals, Calgary, Alberta
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Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Sara Niroomand		Calgary Metals, Calgary, Alberta

General Comments

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

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts 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: 641757)											
CG2212274-001	Anonymous	turbidity	----	E121	0.10	NTU	0.50	0.57	0.06	Diff <2x LOR	----
Physical Tests (QC Lot: 641962)											
CG2212274-001	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	236	236	0.212%	15%	----
Physical Tests (QC Lot: 642495)											
CG2212274-001	Anonymous	pH	----	E108	0.10	pH units	8.17	8.20	0.366%	4%	----
Physical Tests (QC Lot: 642496)											
CG2212274-001	Anonymous	conductivity	----	E100	2.0	µS/cm	1710	1710	0.468%	10%	----
Physical Tests (QC Lot: 642497)											
CG2212274-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	274	271	1.06%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	274	271	1.06%	20%	----
Physical Tests (QC Lot: 642501)											
CG2212274-001	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 645182)											
CG2212233-003	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	837	852	1.72%	20%	----
Anions and Nutrients (QC Lot: 641825)											
CG2212274-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 641921)											
CG2212270-021	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 641956)											
CG2212274-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.195	0.190	0.005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 641957)											
CG2212274-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 641958)											
CG2212274-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.50	mg/L	2.24	2.22	0.01	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 641959)											
CG2212274-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	6.17	6.14	0.419%	20%	----
Anions and Nutrients (QC Lot: 641960)											
CG2212274-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 641961)											

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: 641961) - continued											
CG2212274-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	932	923	0.990%	20%	----
Anions and Nutrients (QC Lot: 642132)											
CG2212274-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.393	0.392	0.0005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 642658)											
CG2212274-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0052	0.0031	0.0020	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 641869)											
CG2212274-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.33	1.37	0.04	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 641870)											
CG2212274-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.39	1.28	0.11	Diff <2x LOR	----
Total Metals (QC Lot: 642722)											
CG2212136-001	Anonymous	mercury, total	7439-97-6	E508	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
Total Metals (QC Lot: 643301)											
CG2212204-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0203	0.0186	0.0017	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00017	0.00017	0.000001	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00048	0.00046	0.00001	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0164	0.0163	0.465%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.032	0.031	0.001	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0142 µg/L	0.0000107	0.0000035	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	236	228	3.49%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.39 µg/L	0.00039	0.000004	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.169	0.170	0.725%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.163	0.154	5.65%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	151	153	1.04%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0284	0.0288	1.56%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00190	0.00187	1.74%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00509	0.00520	2.10%	20%	----
		potassium, total	7440-09-7	E420	0.050	mg/L	4.58	4.63	1.15%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.808 µg/L	0.000831	2.79%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	3.22	3.23	0.333%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	10.5	10.6	1.54%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 643301) - continued											
CG2212204-001	Anonymous	strontium, total	7440-24-6	E420	0.00020	mg/L	0.542	0.539	0.538%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	266	268	0.696%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000020	0.000018	0.000001	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	0.00017	0.00016	0.00002	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00771	0.00771	0.0799%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Total Metals (QC Lot: 643302)											
CG2212204-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 642719)											
CG2212274-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 643704)											
CG2212019-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00017	0.00016	0.000004	Diff <2x LOR	----
Dissolved Metals (QC Lot: 643705)											
CG2212019-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0019	0.0011	0.0008	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00015	0.00015	0.000002	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00024	0.00024	0.000002	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0844	0.0843	0.120%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.028	0.030	0.001	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0223 µg/L	0.0000188	0.0000035	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	96.6	96.1	0.432%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.12 µg/L	0.00011	0.000004	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0145	0.0145	0.159%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	37.8	37.1	1.82%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00217	0.00221	1.79%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00106	0.00108	1.72%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00513	0.00512	0.225%	20%	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.17	1.15	1.90%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	4.74 µg/L	0.00472	0.351%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 643705) - continued											
CG2212019-001	Anonymous	silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.07	2.05	1.03%	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	10.2	10.1	1.39%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.347	0.341	1.84%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	83.8	81.5	2.76%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000020	0.000018	0.000002	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00180	0.00184	2.32%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0010	0.0011	0.00009	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: 641757)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 642496)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 642497)						
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: 642501)						
acidity (as CaCO3)	----	E283	2	mg/L	2.1	----
Physical Tests (QCLot: 645179)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 645182)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 641825)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 641921)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 641956)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 641957)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 641958)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 641959)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 641960)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 641961)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 642132)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 642658)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 642658) - continued						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 641869)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 641870)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 642722)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 643301)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 643301) - continued						
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	----
Total Metals (QCLot: 643302)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 642719)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 643704)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 643705)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 643705) - continued						
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
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	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 641757)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 641962)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	101	95.4	104	----
Physical Tests (QCLot: 642495)									
pH	----	E108	----	pH units	7 pH units	101	98.6	101	----
Physical Tests (QCLot: 642496)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.8	90.0	110	----
Physical Tests (QCLot: 642497)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 642501)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	109	85.0	115	----
Physical Tests (QCLot: 645179)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	102	85.0	115	----
Physical Tests (QCLot: 645182)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	95.4	85.0	115	----
Anions and Nutrients (QCLot: 641825)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.9	85.0	115	----
Anions and Nutrients (QCLot: 641921)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	98.3	80.0	120	----
Anions and Nutrients (QCLot: 641956)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 641957)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 641958)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 641959)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 641960)									
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: 641961)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 642132)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 642132) - continued									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 642658)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	99.4	80.0	120	----
Organic / Inorganic Carbon (QCLot: 641869)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	99.7	80.0	120	----
Organic / Inorganic Carbon (QCLot: 641870)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	97.1	80.0	120	----
Total Metals (QCLot: 642722)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	104	80.0	120	----
Total Metals (QCLot: 643301)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	95.1	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	97.6	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	96.1	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	92.7	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.1	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	96.0	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	95.3	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	96.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	105	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	99.7	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	93.8	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	95.6	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	99.2	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	96.0	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	97.1	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	92.5	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	100	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	91.0	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	96.7	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 643301) - continued									
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.0	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	93.0	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	91.7	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	96.9	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	93.8	80.0	120	----
Total Metals (QCLot: 643302)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	96.8	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 643704)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 643705)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	110	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.2	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	105	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.7	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	111	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.4	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	96.9	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	106	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	91.1	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	104	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 643705) - continued									
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	99.8	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	100	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	96.0	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	99.1	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.0	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	95.8	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: 641825)										
CG2212276-001	RG_FO23_WS_LAEMP_LCO_2022-09_N	ammonia, total (as N)	7664-41-7	E298	0.101 mg/L	0.1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 641921)										
CG2212273-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0538 mg/L	0.05 mg/L	108	70.0	130	----
Anions and Nutrients (QCLot: 641956)										
CG2212276-001	RG_FO23_WS_LAEMP_LCO_2022-09_N	fluoride	16984-48-8	E235.F	0.982 mg/L	1 mg/L	98.2	75.0	125	----
Anions and Nutrients (QCLot: 641957)										
CG2212276-001	RG_FO23_WS_LAEMP_LCO_2022-09_N	bromide	24959-67-9	E235.Br-L	0.514 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 641958)										
CG2212276-001	RG_FO23_WS_LAEMP_LCO_2022-09_N	chloride	16887-00-6	E235.Cl-L	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 641959)										
CG2212276-001	RG_FO23_WS_LAEMP_LCO_2022-09_N	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 641960)										
CG2212276-001	RG_FO23_WS_LAEMP_LCO_2022-09_N	nitrite (as N)	14797-65-0	E235.NO2-L	0.509 mg/L	0.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 641961)										
CG2212276-001	RG_FO23_WS_LAEMP_LCO_2022-09_N	sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 642132)										
CG2212276-001	RG_FO23_WS_LAEMP_LCO_2022-09_N	Kjeldahl nitrogen, total [TKN]	----	E318	2.80 mg/L	2.5 mg/L	112	70.0	130	----
Anions and Nutrients (QCLot: 642658)										
CG2212276-001	RG_FO23_WS_LAEMP_LCO_2022-09_N	phosphorus, total	7723-14-0	E372-U	0.0528 mg/L	0.05 mg/L	106	70.0	130	----
Organic / Inorganic Carbon (QCLot: 641869)										
CG2212274-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	5.37 mg/L	5 mg/L	107	70.0	130	----
Organic / Inorganic Carbon (QCLot: 641870)										
CG2212274-001	Anonymous	carbon, total organic [TOC]	----	E355-L	5.54 mg/L	5 mg/L	111	70.0	130	----
Total Metals (QCLot: 642722)										
CG2212274-001	Anonymous	mercury, total	7439-97-6	E508	0.0000951 mg/L	0.0001 mg/L	95.1	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 643301)										
CG2212274-001	Anonymous	aluminum, total	7429-90-5	E420	2.06 mg/L	2 mg/L	103	70.0	130	----
		antimony, total	7440-36-0	E420	0.208 mg/L	0.2 mg/L	104	70.0	130	----
		arsenic, total	7440-38-2	E420	0.211 mg/L	0.2 mg/L	106	70.0	130	----
		barium, total	7440-39-3	E420	0.220 mg/L	0.2 mg/L	110	70.0	130	----
		beryllium, total	7440-41-7	E420	0.391 mg/L	0.4 mg/L	97.8	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0988 mg/L	0.1 mg/L	98.8	70.0	130	----
		boron, total	7440-42-8	E420	0.936 mg/L	1 mg/L	93.6	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0441 mg/L	0.04 mg/L	110	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.213 mg/L	0.2 mg/L	106	70.0	130	----
		copper, total	7440-50-8	E420	0.216 mg/L	0.2 mg/L	108	70.0	130	----
		iron, total	7439-89-6	E420	21.6 mg/L	20 mg/L	108	70.0	130	----
		lead, total	7439-92-1	E420	0.197 mg/L	0.2 mg/L	98.7	70.0	130	----
		lithium, total	7439-93-2	E420	0.981 mg/L	1 mg/L	98.1	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.216 mg/L	0.2 mg/L	108	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.213 mg/L	0.2 mg/L	106	70.0	130	----
		nickel, total	7440-02-0	E420	0.429 mg/L	0.4 mg/L	107	70.0	130	----
		potassium, total	7440-09-7	E420	41.6 mg/L	40 mg/L	104	70.0	130	----
		selenium, total	7782-49-2	E420	0.420 mg/L	0.4 mg/L	105	70.0	130	----
		silicon, total	7440-21-3	E420	92.2 mg/L	100 mg/L	92.2	70.0	130	----
		silver, total	7440-22-4	E420	0.0428 mg/L	0.04 mg/L	107	70.0	130	----
		sodium, total	7440-23-5	E420	22.3 mg/L	20 mg/L	112	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	200 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		tin, total	7440-31-5	E420	0.213 mg/L	0.2 mg/L	106	70.0	130	----
		titanium, total	7440-32-6	E420	0.408 mg/L	0.4 mg/L	102	70.0	130	----
		uranium, total	7440-61-1	E420	0.0396 mg/L	0.04 mg/L	99.1	70.0	130	----
		vanadium, total	7440-62-2	E420	1.07 mg/L	1 mg/L	107	70.0	130	----
		zinc, total	7440-66-6	E420	4.14 mg/L	4 mg/L	104	70.0	130	----
Total Metals (QCLot: 643302)										
CG2212274-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.435 mg/L	0.4 mg/L	109	70.0	130	----
Dissolved Metals (QCLot: 642719)										
CG2212276-001	RG_FO23_WS_LAEMP_LCO_2022-09_N	mercury, dissolved	7439-97-6	E509	0.000102 mg/L	0.0001 mg/L	102	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 643704)										
CG2212204-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.372 mg/L	0.4 mg/L	93.1	70.0	130	----
Dissolved Metals (QCLot: 643705)										
CG2212204-001	Anonymous	aluminum, dissolved	7429-90-5	E421	1.89 mg/L	2 mg/L	94.7	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.184 mg/L	0.2 mg/L	92.2	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.182 mg/L	0.2 mg/L	91.1	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.186 mg/L	0.2 mg/L	93.3	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.364 mg/L	0.4 mg/L	91.0	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0891 mg/L	0.1 mg/L	89.1	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.969 mg/L	1 mg/L	96.9	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.185 mg/L	0.2 mg/L	92.6	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.181 mg/L	0.2 mg/L	90.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	18.2 mg/L	20 mg/L	91.2	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.192 mg/L	0.2 mg/L	96.1	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.943 mg/L	1 mg/L	94.3	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.186 mg/L	0.2 mg/L	93.0	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.191 mg/L	0.2 mg/L	95.7	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.366 mg/L	0.4 mg/L	91.5	70.0	130	----
		potassium, dissolved	7440-09-7	E421	34.7 mg/L	40 mg/L	86.8	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.377 mg/L	0.4 mg/L	94.3	70.0	130	----
		silicon, dissolved	7440-21-3	E421	91.7 mg/L	100 mg/L	91.7	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0376 mg/L	0.04 mg/L	94.0	70.0	130	----
		sodium, dissolved	7440-23-5	E421	18.6 mg/L	20 mg/L	93.1	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	200 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0344 mg/L	0.04 mg/L	86.1	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.184 mg/L	0.2 mg/L	92.3	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.357 mg/L	0.4 mg/L	89.2	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0368 mg/L	0.04 mg/L	91.9	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.937 mg/L	1 mg/L	93.7	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.66 mg/L	4 mg/L	91.5	70.0	130	----

Teck

COC ID:	REP_LAEMP_LCO_2022-09_ALS	TURNAROUND TIME:	2-3 Business Days	RUSH:	Priorty

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name / Job#	Regional Effects Program			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1:	AquaSciLab@Teck.com	X	X	X
Email	Cybele.Heddle@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	Lisa.Bowron@minnow.ca	X	X	X
City	Sparwood	Provinc	BC	City	Calgary	Provinc	AB	Email 5:	Tyler.Mehler@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6:	Hannah.Penner@Teck.com	X	X	X
Phone Number	1-250-865-3048			Phone Number	403 407 1794			PO number	VPO00816101			

SAMPLE_DETAILS								ANALYSIS REQUESTED									Filtered - F: Field, L: Lab, FL: Field & Lab, N: Non
								Filt.	F	F	N	F	N	N	N		
								PRESERV.	H2SO4	HCL	HCL				H2SO4		
Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	DOC	Mercury_Dissolved	Mercury_Total	TECKCOAL_METNHG_D	TECKCOAL_METNHG_T	TECKCOAL_ROUTINE	TOC_TKN_PT		
RG_FO23_WS_LAEMP_LCO_2022-09_N	RG_FO23	WS		2022/09/09	08:05	G	7		1	1	1	1	1	1	1		
RG_LILC3_WS_LAEMP_LCO_2022-09_N	RG_LILC3	WS		2022/09/08	09:30	G	7		1	1	1	1	1	1	1		

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
Dissolved metals were field filtered and to be lab preserved Total metals to be lab preserved	Jennifer Ings/Minnow	##########	

SERVICE REQUEST (rush - subject to availability)					
Regular (default)		Sampler's Name	Jennifer Ings	Mobile #	5195003444
Priority (2-3 business days) - 50% surcharge	X	Sampler's Signature		Date/Time	
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Environmental Division
Calgary
Work Order Reference
CG2212276

Environmental Division
Calgary
Work Order Reference
CG2212276

Telephone : +1 403 407 1800

9/10

WATER CHEMISTRY

ALS Laboratory Report CG2212561
(Finalized September 17, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2212561**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B2G0	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 14-Sep-2022 09:00
PO	: VPO00816101	Date Analysis Commenced	: 16-Sep-2022
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS	Issue Date	: 17-Sep-2022 15:42
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Metals, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta
Sheida Aria	Lab Assistant	Metals, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLB	*Detection Limit Raised. Analyte detected at comparable level in Method Blank.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
HTA	*Analytical holding time was exceeded.*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	----	----	----	----
					Client sampling date / time: 12-Sep-2022 14:40	----	----	----	----
					CG2212561-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	----	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	205	----	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	250	----	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	6.4	----	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	3.8	----	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	212	----	----	----	----
conductivity	----	E100	2.0	µS/cm	772	----	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	433	----	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV	288	----	----	----	----
pH	----	E108	0.10	pH units	8.34	----	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	530	----	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	1.1	----	----	----	----
turbidity	----	E121	0.10	NTU	0.18 HTA	----	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	----	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	----	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	9.61	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.230	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.500 DLM, TKNI	----	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	6.96	----	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0011	----	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0014	----	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0039	----	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	216	----	----	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	----	----	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	----	----	----	----
					Client sampling date / time: 12-Sep-2022 14:40	----	----	----	----
					CG2212561-001	--------	--------	--------	--------
					Result	----	----	----	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	9.51	----	----	----	----
cation sum	----	EC101	0.10	meq/L	8.99	----	----	----	----
ion balance (cations/anions)	----	EC101	0.010	%	94.5	----	----	----	----
ion balance (APHA)	----	EC101	0.010	%	2.81	----	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0150 DLB	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00022	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00050 DLB	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0638	----	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.016	----	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.168	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	106	----	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00017	----	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	<0.010	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0424	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	44.6	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00278	----	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00234	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00458	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	1.34	----	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L	37.8	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	2.68	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	----	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L	6.97	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	----	----	----	----
					Client sampling date / time: 12-Sep-2022 14:40	----	----	----	----
					CG2212561-001	--------	--------	--------	--------
					Result	----	----	----	----
Total Metals									
strontium, total	7440-24-6	E420	0.00020	mg/L	0.217	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	77.7	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00322	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00250 DLB	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0060	----	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00023	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00011	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0705	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.013	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.157	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	99.2	----	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00014	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L	<0.10	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0384	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	45.1	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00226	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00233	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00456	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.36	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	----	----	----	----
Client sampling date / time					12-Sep-2022 14:40	----	----	----	----
					CG2212561-001	--------	--------	--------	--------
					Result	----	----	----	----
Dissolved Metals									
selenium, dissolved	7782-49-2	E421	0.050	µg/L	43.8	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.47	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	6.88	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.217	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	86.2	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00331	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0057	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2212561**	Page	: 1 of 13
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B2G0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 14-Sep-2022 09:00
PO	: VPO00816101	Issue Date	: 17-Sep-2022 15:42
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS		
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Total Metals	QC-MRG2-650951001	----	aluminum, total	7429-90-5	E420	0.0032 mg/L MB-LOR	0.003 mg/L	Blank result exceeds permitted value
Total Metals	QC-MRG2-650951001	----	arsenic, total	7440-38-2	E420	0.00022 mg/L MB-LOR	0.0001 mg/L	Blank result exceeds permitted value
Total Metals	QC-MRG2-650951001	----	vanadium, total	7440-62-2	E420	0.00170 mg/L MB-LOR	0.0005 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E298	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E235.Br-L	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E235.Cl-L	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E378-U	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	3 days	4 days	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E235.F	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E235.NO3-L	12-Sep-2022	16-Sep-2022	3 days	4 days	× EHT	16-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E235.NO2-L	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	3 days	4 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E235.SO4	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E318	12-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E372-U	12-Sep-2022	16-Sep-2022	----	----		17-Sep-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E421.Cr-L	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E509	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E421	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	180 days	4 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E358-L	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E355-L	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	4 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E283	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	14 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E290	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	14 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E100	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	4 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E125	12-Sep-2022	----	----	----		16-Sep-2022	0.25 hrs	94 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E108	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	0.25 hrs	0.25 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E162	12-Sep-2022	----	----	----		16-Sep-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E160-L	12-Sep-2022	----	----	----		16-Sep-2022	7 days	4 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E121	12-Sep-2022	----	----	----		16-Sep-2022	3 days	4 days	× EHT
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E420.Cr-L	12-Sep-2022	16-Sep-2022	----	----		17-Sep-2022	180 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E508	12-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	E420	12-Sep-2022	16-Sep-2022	----	----		17-Sep-2022	180 days	5 days	✓

Legend & Qualifier Definitions

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

EHT: Exceeded ALS recommended hold time prior to analysis.

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	651335	1	15	6.6	5.0	✓
Alkalinity Species by Titration	E290	651338	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	651291	1	11	9.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	650788	1	12	8.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	650789	1	12	8.3	5.0	✓
Conductivity in Water	E100	651337	1	15	6.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	651141	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	650795	1	8	12.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	651142	1	3	33.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	651190	1	3	33.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	651014	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	650787	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	650790	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	650791	1	16	6.2	5.0	✓
ORP by Electrode	E125	650800	1	1	100.0	5.0	✓
pH by Meter	E108	651336	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	650792	1	13	7.6	5.0	✓
TDS by Gravimetry	E162	651254	1	15	6.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	650951	1	3	33.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	650991	1	1	100.0	5.0	✓
Total Mercury in Water by CVAAS	E508	650796	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	650952	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	651191	1	3	33.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	650784	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	650802	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	651335	1	15	6.6	5.0	✓
Alkalinity Species by Titration	E290	651338	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	651291	1	11	9.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	650788	1	12	8.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	650789	1	12	8.3	5.0	✓
Conductivity in Water	E100	651337	1	15	6.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	651141	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	650795	1	8	12.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	651142	1	3	33.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	651190	1	3	33.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	651014	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	650787	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	650790	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	650791	1	16	6.2	5.0	✓
ORP by Electrode	E125	650800	1	1	100.0	5.0	✓
pH by Meter	E108	651336	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	650792	1	13	7.6	5.0	✓
TDS by Gravimetry	E162	651254	1	15	6.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	650951	1	3	33.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	650991	1	1	100.0	5.0	✓
Total Mercury in Water by CVAAS	E508	650796	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	650952	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	651191	1	3	33.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	650784	1	17	5.8	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	651251	1	14	7.1	5.0	✓
Turbidity by Nephelometry	E121	650802	1	1	100.0	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	651335	1	15	6.6	5.0	✓
Alkalinity Species by Titration	E290	651338	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	651291	1	11	9.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	650788	1	12	8.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	650789	1	12	8.3	5.0	✓
Conductivity in Water	E100	651337	1	15	6.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	651141	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	650795	1	8	12.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	651142	1	3	33.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	651190	1	3	33.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	651014	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	650787	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	650790	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	650791	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	650792	1	13	7.6	5.0	✓
TDS by Gravimetry	E162	651254	1	15	6.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	650951	1	3	33.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	650991	1	1	100.0	5.0	✓
Total Mercury in Water by CVAAS	E508	650796	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	650952	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	651191	1	3	33.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	650784	1	17	5.8	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	651251	1	14	7.1	5.0	✓
Turbidity by Nephelometry	E121	650802	1	1	100.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	651291	1	11	9.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	650788	1	12	8.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	650789	1	12	8.3	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	651141	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	650795	1	8	12.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	651142	1	3	33.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	651190	1	3	33.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	651014	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	650787	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	650790	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	650791	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	650792	1	13	7.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	650951	1	3	33.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	650991	0	1	0.0	5.0	✗
Total Mercury in Water by CVAAS	E508	650796	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	650952	1	6	16.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	651191	1	3	33.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	650784	1	17	5.8	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Calgary - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2212561**	Page	: 1 of 17
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B2G0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 14-Sep-2022 09:00
PO	: VPO00816101	Date Analysis Commenced	: 16-Sep-2022
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS	Issue Date	: 17-Sep-2022 15:42
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Sara Niroomand		Calgary Metals, Calgary, Alberta
Sheida Aria	Lab Assistant	Calgary Metals, Calgary, Alberta

General Comments

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

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts 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: 650800)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	oxidation-reduction potential [ORP]	----	E125	0.10	mV	288	289	0.173%	15%	----
Physical Tests (QC Lot: 650802)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	turbidity	----	E121	0.10	NTU	0.18	0.16	0.02	Diff <2x LOR	----
Physical Tests (QC Lot: 651254)											
CG2212385-001	Anonymous	solids, total dissolved [TDS]	----	E162	40	mg/L	1930	1950	1.08%	20%	----
Physical Tests (QC Lot: 651335)											
CG2212559-001	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 651336)											
CG2212559-001	Anonymous	pH	----	E108	0.10	pH units	8.33	8.34	0.120%	4%	----
Physical Tests (QC Lot: 651337)											
CG2212559-001	Anonymous	conductivity	----	E100	2.0	µS/cm	1540	1530	0.783%	10%	----
Physical Tests (QC Lot: 651338)											
CG2212559-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	238	252	5.95%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	7.6	8.2	0.6	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	246	261	6.00%	20%	----
Anions and Nutrients (QC Lot: 650784)											
CG2212553-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0065	0.0066	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 650787)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	fluoride	16984-48-8	E235.F	0.020	mg/L	0.230	0.230	0.348%	20%	----
Anions and Nutrients (QC Lot: 650788)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 650789)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	9.61	9.62	0.0496%	20%	----
Anions and Nutrients (QC Lot: 650790)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	6.96	6.95	0.155%	20%	----
Anions and Nutrients (QC Lot: 650791)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0011	0.0011	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 650792)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	216	215	0.189%	20%	----
Anions and Nutrients (QC Lot: 650991)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	Kjeldahl nitrogen, total [TKN]	----	E318	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 651014)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0014	0.0014	0.00001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 651291)											
CG2212596-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.619	0.621	0.339%	20%	----
Organic / Inorganic Carbon (QC Lot: 651190)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 651191)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 650796)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 650951)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00017	0.00018	0.00001	Diff <2x LOR	----
Total Metals (QC Lot: 650952)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0150	0.0053	0.0097	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00022	0.00022	0.000005	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00050	0.00037	0.00013	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0638	0.0636	0.375%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.016	0.015	0.0009	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.168 µg/L	0.000142	16.8%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	106	102	4.52%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0424	0.0410	3.40%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	44.6	43.9	1.61%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00278	0.00240	14.7%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 650952) - continued											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00234	0.00220	6.34%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00458	0.00453	0.00005	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.34	1.31	2.76%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	37.8 µg/L	0.0357	5.76%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.68	2.60	2.94%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	6.97	6.88	1.33%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.217	0.205	5.49%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	77.7	74.7	3.91%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00322	0.00311	3.28%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00250	0.00085	0.00165	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0060	0.0054	0.0005	Diff <2x LOR	----
Dissolved Metals (QC Lot: 650795)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 651141)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00014	0.00012	0.00002	Diff <2x LOR	----
Dissolved Metals (QC Lot: 651142)											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00023	0.00022	0.000008	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00011	0.00011	0.0000008	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0705	0.0722	2.46%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.013	0.013	0.0002	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.157 µg/L	0.000158	0.799%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	99.2	96.2	3.08%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0384	0.0373	3.02%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 651142) - continued											
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	45.1	47.3	4.59%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00226	0.00252	11.1%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00233	0.00236	1.49%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00456	0.00459	0.00002	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.36	1.42	4.65%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	43.8 µg/L	0.0431	1.81%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.47	2.49	1.06%	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	6.88	7.17	4.13%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.217	0.215	0.947%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	86.2	86.4	0.236%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00331	0.00331	0.0227%	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	0.0057	0.0056	0.0002	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: 650802)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 651251)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 651254)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 651335)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 651337)						
conductivity	----	E100	1	µS/cm	1.0	----
Physical Tests (QCLot: 651338)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 650784)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 650787)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 650788)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 650789)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 650790)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 650791)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 650792)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 650991)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 651014)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 651291)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 651291) - continued						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 651190)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 651191)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 650796)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 650951)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 650952)						
aluminum, total	7429-90-5	E420	0.003	mg/L	# 0.0032	MB-LOR
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	# 0.00022	MB-LOR
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	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 650952) - continued						
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	# 0.00170	MB-LOR
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 650795)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 651141)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 651142)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 651142) - continued						
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
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	----

Qualifiers

Qualifier	Description
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 650800)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	101	95.4	104	----
Physical Tests (QCLot: 650802)									
turbidity	----	E121	0.1	NTU	200 NTU	106	85.0	115	----
Physical Tests (QCLot: 651251)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	93.9	85.0	115	----
Physical Tests (QCLot: 651254)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	93.0	85.0	115	----
Physical Tests (QCLot: 651335)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	106	85.0	115	----
Physical Tests (QCLot: 651336)									
pH	----	E108	----	pH units	7 pH units	101	98.6	101	----
Physical Tests (QCLot: 651337)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.6	90.0	110	----
Physical Tests (QCLot: 651338)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 650784)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	96.8	80.0	120	----
Anions and Nutrients (QCLot: 650787)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 650788)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 650789)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 650790)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 650791)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 650792)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 650991)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 651014)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 651014) - continued									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	94.5	80.0	120	----
Anions and Nutrients (QCLot: 651291)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	103	85.0	115	----
Organic / Inorganic Carbon (QCLot: 651190)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	94.9	80.0	120	----
Organic / Inorganic Carbon (QCLot: 651191)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	97.8	80.0	120	----
Total Metals (QCLot: 650796)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	94.5	80.0	120	----
Total Metals (QCLot: 650951)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
Total Metals (QCLot: 650952)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	97.5	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	95.9	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	98.0	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	97.1	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	98.0	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	86.2	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	95.9	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.6	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	95.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	95.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	110	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.3	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	104	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	92.7	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.6	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	100.0	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	96.9	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	98.5	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	84.9	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	101	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	84.8	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	97.4	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 650952) - continued									
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	96.2	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	87.7	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	97.2	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.5	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	91.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	95.9	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	94.9	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	96.2	80.0	120	----
Dissolved Metals (QCLot: 651141)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 651142)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	104	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	95.4	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	97.3	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	86.0	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	96.9	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	114	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	99.1	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	101	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	96.9	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	105	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	95.7	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 651142) - continued									
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	120	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.6	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	103	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	101	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	101	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	107	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: 650784)										
CG2212553-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0490 mg/L	0.05 mg/L	97.9	70.0	130	----
Anions and Nutrients (QCLot: 650787)										
CG2212595-003	Anonymous	fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 650788)										
CG2212595-003	Anonymous	bromide	24959-67-9	E235.Br-L	0.514 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 650789)										
CG2212595-003	Anonymous	chloride	16887-00-6	E235.Cl-L	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 650790)										
CG2212595-003	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.52 mg/L	2.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 650791)										
CG2212595-003	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.511 mg/L	0.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 650792)										
CG2212595-003	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 651014)										
CG2212600-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0518 mg/L	0.05 mg/L	104	70.0	130	----
Anions and Nutrients (QCLot: 651291)										
CG2212596-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Organic / Inorganic Carbon (QCLot: 651190)										
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	carbon, dissolved organic [DOC]	----	E358-L	5.41 mg/L	5 mg/L	108	70.0	130	----
Organic / Inorganic Carbon (QCLot: 651191)										
CG2212561-001	RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	carbon, total organic [TOC]	----	E355-L	5.73 mg/L	5 mg/L	115	70.0	130	----
Total Metals (QCLot: 650796)										
CG2212562-001	Anonymous	mercury, total	7439-97-6	E508	0.0000987 mg/L	0.0001 mg/L	98.7	70.0	130	----
Total Metals (QCLot: 650951)										
CG2212596-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.416 mg/L	0.4 mg/L	104	70.0	130	----
Total Metals (QCLot: 650952)										
CG2212596-001	Anonymous	aluminum, total	7429-90-5	E420	2.00 mg/L	2 mg/L	100	70.0	130	----
		antimony, total	7440-36-0	E420	0.217 mg/L	0.2 mg/L	108	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 650952) - continued										
CG2212596-001	Anonymous	arsenic, total	7440-38-2	E420	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		barium, total	7440-39-3	E420	0.196 mg/L	0.2 mg/L	98.0	70.0	130	----
		beryllium, total	7440-41-7	E420	0.400 mg/L	0.4 mg/L	100	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0987 mg/L	0.1 mg/L	98.7	70.0	130	----
		boron, total	7440-42-8	E420	1.03 mg/L	1 mg/L	103	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		copper, total	7440-50-8	E420	0.200 mg/L	0.2 mg/L	100.0	70.0	130	----
		iron, total	7439-89-6	E420	20.6 mg/L	20 mg/L	103	70.0	130	----
		lead, total	7439-92-1	E420	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		lithium, total	7439-93-2	E420	0.980 mg/L	1 mg/L	98.0	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.203 mg/L	0.2 mg/L	102	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.216 mg/L	0.2 mg/L	108	70.0	130	----
		nickel, total	7440-02-0	E420	0.408 mg/L	0.4 mg/L	102	70.0	130	----
		potassium, total	7440-09-7	E420	39.8 mg/L	40 mg/L	99.6	70.0	130	----
		selenium, total	7782-49-2	E420	0.426 mg/L	0.4 mg/L	106	70.0	130	----
		silicon, total	7440-21-3	E420	104 mg/L	100 mg/L	104	70.0	130	----
		silver, total	7440-22-4	E420	0.0444 mg/L	0.04 mg/L	111	70.0	130	----
		sodium, total	7440-23-5	E420	20.0 mg/L	20 mg/L	99.9	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	200 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.0390 mg/L	0.04 mg/L	97.5	70.0	130	----
		tin, total	7440-31-5	E420	0.212 mg/L	0.2 mg/L	106	70.0	130	----
		titanium, total	7440-32-6	E420	0.382 mg/L	0.4 mg/L	95.5	70.0	130	----
		uranium, total	7440-61-1	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		vanadium, total	7440-62-2	E420	1.04 mg/L	1 mg/L	104	70.0	130	----
		zinc, total	7440-66-6	E420	4.00 mg/L	4 mg/L	100.0	70.0	130	----
Dissolved Metals (QCLot: 650795)										
CG2212562-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000970 mg/L	0.0001 mg/L	97.0	70.0	130	----
Dissolved Metals (QCLot: 651141)										
CG2212596-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.378 mg/L	0.4 mg/L	94.5	70.0	130	----
Dissolved Metals (QCLot: 651142)										
CG2212596-001	Anonymous	aluminum, dissolved	7429-90-5	E421	1.85 mg/L	2 mg/L	92.5	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 651142) - continued										
CG2212596-001	Anonymous	arsenic, dissolved	7440-38-2	E421	0.186 mg/L	0.2 mg/L	92.8	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.185 mg/L	0.2 mg/L	92.7	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.349 mg/L	0.4 mg/L	87.3	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0935 mg/L	0.1 mg/L	93.5	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.808 mg/L	1 mg/L	80.8	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0373 mg/L	0.04 mg/L	93.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.182 mg/L	0.2 mg/L	91.0	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.177 mg/L	0.2 mg/L	88.5	70.0	130	----
		iron, dissolved	7439-89-6	E421	18.0 mg/L	20 mg/L	90.2	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.185 mg/L	0.2 mg/L	92.7	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.844 mg/L	1 mg/L	84.4	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.196 mg/L	0.2 mg/L	98.0	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.194 mg/L	0.2 mg/L	97.0	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.361 mg/L	0.4 mg/L	90.3	70.0	130	----
		potassium, dissolved	7440-09-7	E421	35.7 mg/L	40 mg/L	89.2	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.354 mg/L	0.4 mg/L	88.5	70.0	130	----
		silicon, dissolved	7440-21-3	E421	90.5 mg/L	100 mg/L	90.5	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		sodium, dissolved	7440-23-5	E421	17.3 mg/L	20 mg/L	86.5	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	200 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0372 mg/L	0.04 mg/L	93.1	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.191 mg/L	0.2 mg/L	95.3	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.343 mg/L	0.4 mg/L	85.8	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0392 mg/L	0.04 mg/L	98.1	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.894 mg/L	1 mg/L	89.4	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.87 mg/L	4 mg/L	96.8	70.0	130	----

Teck

COC ID:	REP_LAEMP_LCO_2022-09_ALS	TURNAROUND TIME:	2-3 Business Days	RUSH:	Priorty

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1:	AquaSciLab@Teck.com	X	X	X
Email	Cybele.Heddle@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	Lisa.Bowron@minnow.ca	X	X	X
City	Sparwood	Provinc	BC	City	Calgary	Provinc	AB	Email 5:	Tyler.Mehler@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6:	Hannah.Penner@Teck.com	X	X	X
Phone Number	1-250-865-3048			Phone Number	403 407 1794			PO number	VPO00816101			

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: Non)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Filt.	F	F	N	F	N	N	N
								PRESERV.	H2SO4	HCL	HCL				H2SO4
								ANALYSIS	DOC	Mercury_Dissolved	Mercury_Total	TECKCOAL_METNHG_D	TECKCOAL_METNHG_T	TECKCOAL_ROUTINE	TOC_TKN_PT
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	RG_LIDCOM	WS		2022/09/12	14:40	G	7		1	1	1	1	1	1	1

Environmental Division
Calgary
Work Order Reference
CG2212561

Telephone : +1 403 407 1800

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Dissolved metals were field filtered and to be lab preserved Total metals to be lab preserved	Jennifer Ings/Minnow	##########		9/14 9:00

SERVICE REQUEST (rush - subject to availability)					
Regular (default)		Sampler's Name	Jennifer Ings	Mobile #	5195003444
Priority (2-3 business days) - 50% surcharge	X				
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature		Date/Time	September 13, 2022
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Environmental Division
Calgary
Work Order Reference
CG2212561

11 e

WATER CHEMISTRY

ALS Laboratory Report CG2212665
(Finalized September 20, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2212665**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 16-Sep-2022 08:50
PO	: VPO00816101	Date Analysis Commenced	: 17-Sep-2022
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS	Issue Date	: 20-Sep-2022 16:27
Sampler	: Jennifer Ings/Minnow		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Anthony Calero	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Mackenzie Lamoureux	Laboratory Analyst	Metals, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_LISP24_WS_LAEMP_LCO_2022-09_N	----	----	----	----
					Client sampling date / time: 14-Sep-2022 14:55	----	----	----	----
					CG2212665-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	----	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	219	----	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	267	----	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	219	----	----	----	----
conductivity	----	E100	2.0	µS/cm	836	----	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	460	----	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV	294	----	----	----	----
pH	----	E108	0.10	pH units	8.21	----	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	587	----	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	1.2	----	----	----	----
turbidity	----	E121	0.10	NTU	0.21	----	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0050	----	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	----	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	11.5	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.230	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.455 TKNI	----	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	8.48	----	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0021	----	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	----	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0021	----	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	251	----	----	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	----	----	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_LISP24_WS_LAEMP_LCO_2022-09_N	----	----	----	----
					Client sampling date / time: 14-Sep-2022 14:55	----	----	----	----
					CG2212665-001	--------	--------	--------	--------
					Result	----	----	----	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	10.5	----	----	----	----
cation sum	----	EC101	0.10	meq/L	9.54	----	----	----	----
ion balance (cations/anions)	----	EC101	0.010	%	90.8	----	----	----	----
ion balance (APHA)	----	EC101	0.010	%	4.79	----	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0033	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00026	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00015	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0547	----	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.016	----	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.235	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	108	----	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00021	----	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.013	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0464	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	51.1	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00688	----	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00233	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00702	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	1.43	----	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L	39.6	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	2.44	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	----	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L	7.60	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LISP24_WS_LAEMP_LCO_2022-09_N	----	----	----	----
					Client sampling date / time	14-Sep-2022 14:55	----	----	----	----
						CG2212665-001	--------	--------	--------	--------
						Result	----	----	----	----
Total Metals										
strontium, total	7440-24-6	E420	0.00020	mg/L		0.209	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		97.7	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00362	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0093	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		<0.0010	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00024	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00010	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0552	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.014	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.231	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		104	----	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		0.00013	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L		<0.10	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00023	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0499	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		48.6	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00624	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00233	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00690	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.39	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_LISP24_WS_LAEMP_LCO_2022-09_N	----	----	----	----
					Client sampling date / time: 14-Sep-2022 14:55	----	----	----	----
					CG2212665-001	--------	--------	--------	--------
					Result	----	----	----	----
Dissolved Metals									
selenium, dissolved	7782-49-2	E421	0.050	µg/L	43.8	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.40	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	7.41	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.210	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	94.7	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00363	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0094	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2212665**	Page	: 1 of 12
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 16-Sep-2022 08:50
PO	: VPO00816101	Issue Date	: 20-Sep-2022 16:28
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS		
Sampler	: Jennifer Ings/Minnow		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- 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 / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E298	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E235.Br-L	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E235.Cl-L	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E378-U	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E235.F	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E235.NO3-L	14-Sep-2022	17-Sep-2022	3 days	3 days	✓	17-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E235.NO2-L	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	3 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E235.SO4	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E318	14-Sep-2022	18-Sep-2022	----	----		18-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E372-U	14-Sep-2022	19-Sep-2022	----	----		20-Sep-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E421.Cr-L	14-Sep-2022	19-Sep-2022	----	----		19-Sep-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E509	14-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E421	14-Sep-2022	19-Sep-2022	----	----		19-Sep-2022	180 days	5 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E358-L	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E355-L	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	3 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E283	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	14 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-09_N	E290	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-09_N	E100	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	3 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-09_N	E125	14-Sep-2022	----	----	----		17-Sep-2022	0.25 hrs	67 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-09_N	E108	14-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	0.25 hrs	0.25 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-09_N	E162	14-Sep-2022	----	----	----		17-Sep-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_LISP24_WS_LAEMP_LCO_2022-09_N	E160-L	14-Sep-2022	----	----	----		17-Sep-2022	7 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-09_N	E121	14-Sep-2022	----	----	----		17-Sep-2022	3 days	3 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_LISP24_WS_LAEMP_LCO_2022-09_N	E420.Cr-L	14-Sep-2022	18-Sep-2022	----	----		18-Sep-2022	180 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LISP24_WS_LAEMP_LCO_2022-09_N	E508	14-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_LISP24_WS_LAEMP_LCO_2022-09_N	E420	14-Sep-2022	18-Sep-2022	----	----		18-Sep-2022	180 days	4 days	✓

Legend & Qualifier Definitions

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

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	652128	1	19	5.2	5.0	✓
Alkalinity Species by Titration	E290	652131	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	652333	1	9	11.1	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	652450	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	652451	1	20	5.0	5.0	✓
Conductivity in Water	E100	652130	1	19	5.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	653366	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	655111	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	653367	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	652321	1	13	7.6	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	651928	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	652449	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	652452	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	652453	1	20	5.0	5.0	✓
ORP by Electrode	E125	652149	1	19	5.2	5.0	✓
pH by Meter	E108	652129	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	652454	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	652293	1	17	5.8	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	652285	1	9	11.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	652135	1	1	100.0	5.0	✓
Total Mercury in Water by CVAAS	E508	655100	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	652286	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	652326	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	653712	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	651923	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	652128	1	19	5.2	5.0	✓
Alkalinity Species by Titration	E290	652131	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	652333	1	9	11.1	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	652450	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	652451	1	20	5.0	5.0	✓
Conductivity in Water	E100	652130	1	19	5.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	653366	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	655111	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	653367	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	652321	1	13	7.6	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	651928	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	652449	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	652452	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	652453	1	20	5.0	5.0	✓
ORP by Electrode	E125	652149	1	19	5.2	5.0	✓
pH by Meter	E108	652129	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	652454	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	652293	1	17	5.8	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	652285	1	9	11.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	652135	1	1	100.0	5.0	✓
Total Mercury in Water by CVAAS	E508	655100	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	652286	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	652326	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	653712	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	652292	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	651923	1	14	7.1	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	652128	1	19	5.2	5.0	✓
Alkalinity Species by Titration	E290	652131	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	652333	1	9	11.1	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	652450	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	652451	1	20	5.0	5.0	✓
Conductivity in Water	E100	652130	1	19	5.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	653366	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	655111	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	653367	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	652321	1	13	7.6	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	651928	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	652449	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	652452	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	652453	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	652454	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	652293	1	17	5.8	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	652285	1	9	11.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	652135	1	1	100.0	5.0	✓
Total Mercury in Water by CVAAS	E508	655100	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	652286	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	652326	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	653712	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	652292	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	651923	1	14	7.1	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	652333	1	9	11.1	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	652450	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	652451	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	653366	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	655111	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	653367	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	652321	1	13	7.6	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	651928	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	652449	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	652452	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	652453	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	652454	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	652285	1	9	11.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	652135	0	1	0.0	5.0	×
Total Mercury in Water by CVAAS	E508	655100	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	652286	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	652326	1	13	7.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	653712	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Calgary - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2212665**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 16-Sep-2022 08:50
PO	: VPO00816101	Date Analysis Commenced	: 17-Sep-2022
C-O-C number	: REP_LAEMP_LCO_2022-09_ALS	Issue Date	: 20-Sep-2022 16:27
Sampler	: Jennifer Ings/Minnow		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Calgary Inorganics, Calgary, Alberta
Anthony Calero	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Mackenzie Lamoureux	Laboratory Analyst	Calgary Metals, Calgary, Alberta
Ruifang Zheng	Analyst	Calgary Inorganics, Calgary, Alberta
Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Shirley Li		Calgary Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Calgary Inorganics, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 651923)											
CG2212626-001	Anonymous	turbidity	----	E121	0.10	NTU	0.95	1.01	0.06	Diff <2x LOR	----
Physical Tests (QC Lot: 652128)											
CG2212650-001	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 652129)											
CG2212650-001	Anonymous	pH	----	E108	0.10	pH units	8.34	8.31	0.360%	4%	----
Physical Tests (QC Lot: 652130)											
CG2212650-001	Anonymous	conductivity	----	E100	2.0	µS/cm	287	288	0.348%	10%	----
Physical Tests (QC Lot: 652131)											
CG2212650-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	144	156	7.92%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	6.8	5.4	1.4	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	151	162	6.72%	20%	----
Physical Tests (QC Lot: 652149)											
CG2212650-001	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	268	269	0.186%	15%	----
Physical Tests (QC Lot: 652293)											
CG2212657-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1400	1420	1.38%	20%	----
Anions and Nutrients (QC Lot: 651928)											
CG2212626-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0048	0.0047	0.00008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 652135)											
CG2212665-001	RG_LISP24_WS_LAEMP_LCO_2022-09_N	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.455	0.432	0.023	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 652333)											
CG2212663-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 652449)											
CG2212665-001	RG_LISP24_WS_LAEMP_LCO_2022-09_N	fluoride	16984-48-8	E235.F	0.020	mg/L	0.230	0.233	0.994%	20%	----
Anions and Nutrients (QC Lot: 652450)											
CG2212665-001	RG_LISP24_WS_LAEMP_LCO_2022-09_N	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 652451)											
CG2212665-001	RG_LISP24_WS_LAEMP_LCO_2022-09_N	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	11.5	11.4	0.431%	20%	----
Anions and Nutrients (QC Lot: 652452)											

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: 652452) - continued											
CG2212665-001	RG_LISP24_WS_LAEMP_LCO_2022-09_N	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	8.48	8.46	0.276%	20%	----
Anions and Nutrients (QC Lot: 652453)											
CG2212665-001	RG_LISP24_WS_LAEMP_LCO_2022-09_N	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0021	0.0021	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 652454)											
CG2212665-001	RG_LISP24_WS_LAEMP_LCO_2022-09_N	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	251	250	0.425%	20%	----
Anions and Nutrients (QC Lot: 653712)											
CG2212650-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0033	0.0035	0.0002	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 652321)											
CG2212662-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 652326)											
CG2212662-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 652285)											
CG2212663-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Total Metals (QC Lot: 652286)											
CG2212663-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0057	<0.0030	0.0027	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0050 µg/L	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	0.0066	<0.0050	0.0016	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.050 µg/L	<0.000050	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: 652286) - continued											
CG2212663-001	Anonymous	silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Total Metals (QC Lot: 655100)											
CG2212650-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	0.0000055	0.0000005	Diff <2x LOR	----
Dissolved Metals (QC Lot: 653366)											
CG2212376-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00018	0.00017	0.00002	Diff <2x LOR	----
Dissolved Metals (QC Lot: 653367)											
CG2212376-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00014	0.00012	0.00002	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0432	0.0414	4.29%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0050 µg/L	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	44.6	43.6	2.14%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0038	0.0036	0.0001	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	12.1	11.7	2.73%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000923	0.000900	2.55%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.260	0.262	0.001	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: 653367) - continued											
CG2212376-001	Anonymous	selenium, dissolved	7782-49-2	E421	0.000050	mg/L	3.40 µg/L	0.00320	6.14%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.63	1.56	4.72%	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	1.30	1.27	2.53%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.159	0.154	2.87%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	19.1	18.0	5.64%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00111	0.00119	7.45%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0016	0.0013	0.0003	Diff <2x LOR	----
Dissolved Metals (QC Lot: 655111)											
CG2212650-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 651923)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 652128)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 652130)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 652131)						
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: 652292)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 652293)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 651928)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 652135)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 652333)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 652449)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 652450)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 652451)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 652452)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 652453)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 652454)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 653712)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 653712) - continued						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 652321)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 652326)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 652285)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 652286)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 652286) - continued						
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	----
Total Metals (QCLot: 655100)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 653366)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 653367)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 653367) - continued						
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	----
Dissolved Metals (QCLot: 655111)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 651923)									
turbidity	----	E121	0.1	NTU	200 NTU	109	85.0	115	----
Physical Tests (QCLot: 652128)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	106	85.0	115	----
Physical Tests (QCLot: 652129)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 652130)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.3	90.0	110	----
Physical Tests (QCLot: 652131)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	101	85.0	115	----
Physical Tests (QCLot: 652149)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	100	95.4	104	----
Physical Tests (QCLot: 652292)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	88.9	85.0	115	----
Physical Tests (QCLot: 652293)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	92.5	85.0	115	----
Anions and Nutrients (QCLot: 651928)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	92.8	80.0	120	----
Anions and Nutrients (QCLot: 652135)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 652333)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	96.4	85.0	115	----
Anions and Nutrients (QCLot: 652449)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 652450)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 652451)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 652452)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 652453)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 652454)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 652454) - continued									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 653712)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	95.2	80.0	120	----
Organic / Inorganic Carbon (QCLot: 652321)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	96.7	80.0	120	----
Organic / Inorganic Carbon (QCLot: 652326)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	104	80.0	120	----
Total Metals (QCLot: 652285)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	96.7	80.0	120	----
Total Metals (QCLot: 652286)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	97.2	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.5	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	96.5	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	97.3	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	97.9	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	96.7	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	96.0	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	111	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.6	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.4	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	99.4	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.3	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	96.9	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	99.7	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	91.9	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	100	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	90.5	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	98.3	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	106	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 652286) - continued									
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	98.1	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.4	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	99.5	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	96.4	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	99.9	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	97.0	80.0	120	----
Total Metals (QCLot: 655100)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	118	80.0	120	----
Dissolved Metals (QCLot: 653366)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	99.4	80.0	120	----
Dissolved Metals (QCLot: 653367)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	104	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	97.7	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	98.6	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	95.6	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	86.6	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.4	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.0	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.0	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.5	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	113	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	94.6	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	96.8	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	98.7	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	90.7	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	103	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	86.3	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	97.8	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	96.7	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 653367) - continued									
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	95.4	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	94.8	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	92.7	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	92.8	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	99.4	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	95.8	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: 651928)										
CG2212650-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0514 mg/L	0.05 mg/L	103	70.0	130	----
Anions and Nutrients (QCLot: 652333)										
CG2212663-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.101 mg/L	0.1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 652449)										
CG2212674-001	Anonymous	fluoride	16984-48-8	E235.F	0.890 mg/L	1 mg/L	89.0	75.0	125	----
Anions and Nutrients (QCLot: 652450)										
CG2212674-001	Anonymous	bromide	24959-67-9	E235.Br-L	ND mg/L	0.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 652451)										
CG2212674-001	Anonymous	chloride	16887-00-6	E235.Cl-L	92.0 mg/L	100 mg/L	92.0	75.0	125	----
Anions and Nutrients (QCLot: 652452)										
CG2212674-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.33 mg/L	2.5 mg/L	93.1	75.0	125	----
Anions and Nutrients (QCLot: 652453)										
CG2212674-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.467 mg/L	0.5 mg/L	93.5	75.0	125	----
Anions and Nutrients (QCLot: 652454)										
CG2212674-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 653712)										
CG2212650-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0504 mg/L	0.05 mg/L	101	70.0	130	----
Organic / Inorganic Carbon (QCLot: 652321)										
CG2212662-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	5.49 mg/L	5 mg/L	110	70.0	130	----
Organic / Inorganic Carbon (QCLot: 652326)										
CG2212662-001	Anonymous	carbon, total organic [TOC]	----	E355-L	6.35 mg/L	5 mg/L	127	70.0	130	----
Total Metals (QCLot: 652285)										
CG2212663-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.500 mg/L	0.4 mg/L	125	70.0	130	----
Total Metals (QCLot: 652286)										
CG2212663-002	Anonymous	aluminum, total	7429-90-5	E420	2.36 mg/L	2 mg/L	118	70.0	130	----
		antimony, total	7440-36-0	E420	0.238 mg/L	0.2 mg/L	119	70.0	130	----
		arsenic, total	7440-38-2	E420	0.251 mg/L	0.2 mg/L	126	70.0	130	----
		barium, total	7440-39-3	E420	0.221 mg/L	0.2 mg/L	111	70.0	130	----
		beryllium, total	7440-41-7	E420	0.489 mg/L	0.4 mg/L	122	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 652286) - continued										
CG2212663-002	Anonymous	bismuth, total	7440-69-9	E420	0.113 mg/L	0.1 mg/L	113	70.0	130	----
		boron, total	7440-42-8	E420	1.13 mg/L	1 mg/L	113	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0506 mg/L	0.04 mg/L	127	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.256 mg/L	0.2 mg/L	128	70.0	130	----
		copper, total	7440-50-8	E420	0.250 mg/L	0.2 mg/L	125	70.0	130	----
		iron, total	7439-89-6	E420	24.7 mg/L	20 mg/L	123	70.0	130	----
		lead, total	7439-92-1	E420	0.233 mg/L	0.2 mg/L	116	70.0	130	----
		lithium, total	7439-93-2	E420	1.22 mg/L	1 mg/L	122	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.256 mg/L	0.2 mg/L	128	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.239 mg/L	0.2 mg/L	120	70.0	130	----
		nickel, total	7440-02-0	E420	0.505 mg/L	0.4 mg/L	126	70.0	130	----
		potassium, total	7440-09-7	E420	49.9 mg/L	40 mg/L	125	70.0	130	----
		selenium, total	7782-49-2	E420	0.482 mg/L	0.4 mg/L	120	70.0	130	----
		silicon, total	7440-21-3	E420	97.5 mg/L	100 mg/L	97.5	70.0	130	----
		silver, total	7440-22-4	E420	0.0493 mg/L	0.04 mg/L	123	70.0	130	----
		sodium, total	7440-23-5	E420	22.4 mg/L	20 mg/L	112	70.0	130	----
		strontium, total	7440-24-6	E420	0.193 mg/L	0.2 mg/L	96.4	70.0	130	----
		sulfur, total	7704-34-9	E420	214 mg/L	200 mg/L	107	70.0	130	----
		thallium, total	7440-28-0	E420	0.0455 mg/L	0.04 mg/L	114	70.0	130	----
		tin, total	7440-31-5	E420	0.237 mg/L	0.2 mg/L	119	70.0	130	----
		titanium, total	7440-32-6	E420	0.520 mg/L	0.4 mg/L	130	70.0	130	----
		uranium, total	7440-61-1	E420	0.0476 mg/L	0.04 mg/L	119	70.0	130	----
		vanadium, total	7440-62-2	E420	1.27 mg/L	1 mg/L	127	70.0	130	----
		zinc, total	7440-66-6	E420	5.05 mg/L	4 mg/L	126	70.0	130	----
Total Metals (QCLot: 655100)										
CG2212650-002	Anonymous	mercury, total	7439-97-6	E508	0.0000937 mg/L	0.0001 mg/L	93.7	70.0	130	----
Dissolved Metals (QCLot: 653366)										
CG2212376-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.366 mg/L	0.4 mg/L	91.5	70.0	130	----
Dissolved Metals (QCLot: 653367)										
CG2212376-002	Anonymous	aluminum, dissolved	7429-90-5	E421	1.87 mg/L	2 mg/L	93.6	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.188 mg/L	0.2 mg/L	94.1	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.176 mg/L	0.2 mg/L	88.0	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.182 mg/L	0.2 mg/L	91.3	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.369 mg/L	0.4 mg/L	92.2	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 653367) - continued										
CG2212376-002	Anonymous	bismuth, dissolved	7440-69-9	E421	0.0851 mg/L	0.1 mg/L	85.1	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.824 mg/L	1 mg/L	82.4	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0355 mg/L	0.04 mg/L	88.8	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.182 mg/L	0.2 mg/L	91.0	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.181 mg/L	0.2 mg/L	90.4	70.0	130	----
		iron, dissolved	7439-89-6	E421	17.9 mg/L	20 mg/L	89.7	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.174 mg/L	0.2 mg/L	86.9	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.983 mg/L	1 mg/L	98.3	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.182 mg/L	0.2 mg/L	91.2	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.184 mg/L	0.2 mg/L	92.2	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.363 mg/L	0.4 mg/L	90.8	70.0	130	----
		potassium, dissolved	7440-09-7	E421	35.4 mg/L	40 mg/L	88.6	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.339 mg/L	0.4 mg/L	84.8	70.0	130	----
		silicon, dissolved	7440-21-3	E421	72.6 mg/L	100 mg/L	72.6	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0363 mg/L	0.04 mg/L	90.7	70.0	130	----
		sodium, dissolved	7440-23-5	E421	18.6 mg/L	20 mg/L	92.8	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.183 mg/L	0.2 mg/L	91.4	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	171 mg/L	200 mg/L	85.4	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0342 mg/L	0.04 mg/L	85.4	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.176 mg/L	0.2 mg/L	88.2	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.355 mg/L	0.4 mg/L	88.8	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0347 mg/L	0.04 mg/L	86.8	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.881 mg/L	1 mg/L	88.1	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.80 mg/L	4 mg/L	95.1	70.0	130	----
Dissolved Metals (QCLot: 655111)										
CG2212650-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000938 mg/L	0.0001 mg/L	93.8	70.0	130	----

Teck

COC ID:	REP_LAEMP_LCO_2022-09_ALS	TURNAROUND TIME:	2-3 Business Days	RUSH:	Priorty

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name / Job#	Regional Effects Program			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1:	AquaSciLab@Teck.com	X	X	X
Email	Cybele.Heddle@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	Lisa.Bowron@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Tyler.Mehler@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6:	Hannah.Penner@Teck.com	X	X	X
Phone Number	1-250-865-3048			Phone Number	403 407 1794			PO number	VPO00816101			

SAMPLE DETAILS								ANALYSIS REQUESTED											Filtered - F: Field, L: Lab, FL: Field & Lab, N: None
								Filt.	F	F	N	F	N	N	N				
								PRESERV.	H2SO4	HCL	HCL				H2SO4				
Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	DOC	Mercury_Dissolved	Mercury_Total	TECKCOAL_METNHG_D	TECKCOAL_METNHG_T	TECKCOAL_ROUTINE	TOC_TKN_PT				
RG_LISP24_WS_LAEMP_LCO_2022-09_N	RG_LISP24	WS		2022/09/14	14:55	G	7		1	1	1	1	1	1	1				

Environmental Division
Calgary
Work Order Reference
CG2212665

Telephone : +1 403 407 1800

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Dissolved metals were field filtered and to be lab preserved Total metals to be lab preserved	Jennifer Ings/Minnow	##########		9/16/50

SERVICE REQUEST (rush - subject to availability)					
Regular (default)		Sampler's Name	Jennifer Ings	Mobile #	5195003444
Priority (2-3 business days) - 50% surcharge	X				
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature		Date/Time	September 15, 2022
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Environmental Division
Calgary
Work Order Reference
CG2212665

WATER CHEMISTRY

ALS Laboratory Report CG2212821
(Finalized September 22, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2212821**	Page	: 1 of 7
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 17-Sep-2022 11:38
PO	: VPO00816101	Date Analysis Commenced	: 20-Sep-2022
C-O-C number	: REP_LAEM_LCO_2022-09_ALS	Issue Date	: 22-Sep-2022 14:24
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Anthony Calero	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Mackenzie Lamoureux	Laboratory Analyst	Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Summie Lo	Lab Assistant	Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Workorder Comments

Dissolved HG Arrived Broken for Fraction 4

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
HTA	*Analytical holding time was exceeded.*
RRV	*Reported result verified by repeat analysis.*

TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LCUT_WS_LAEMP_LCO_2022-09_N	RG_RIVER_WS_LAEMP_LCO_2022-09_N	RG_FBLANK_WS_LAEMP_LCO_2022-09_N	RG_TRIP_WS_LAEMP_LCO_2022-09_N	----
					Client sampling date / time	15-Sep-2022 11:30	15-Sep-2022 11:30	15-Sep-2022 11:30	15-Sep-2022 11:30	----
						CG2212821-001	CG2212821-002	CG2212821-003	CG2212821-004	--------
						Result	Result	Result	Result	----
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	<2.0	<2.0	<2.0	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		225	231	<1.0	<1.0	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		274	282	<1.0	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		225	231	<1.0	<1.0	----
conductivity	----	E100	2.0	µS/cm		990	986	<2.0	<2.0	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		540	535	<0.50	<0.50	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV		283	281	506	463	----
pH	----	E108	0.10	pH units		8.22	8.21	5.80	5.39	----
solids, total dissolved [TDS]	----	E162	10	mg/L		761	743	<10	<10	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		5.4	<1.0	<1.0	<1.0	----
turbidity	----	E121	0.10	NTU		0.22	0.19	<0.10	<0.10	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	0.0273 RRV	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	<0.250 DLDS	<0.050	<0.050	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		9.26	9.33	<0.10	<0.10	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.210	0.218	<0.020	<0.020	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		1.34 TKNI	<0.500 DLM, TKNI	<0.050	<0.050	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		14.2	14.3	<0.0050	<0.0050	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	<0.0010	<0.0010	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0023 HTA	0.0032 HTA	<0.0010 HTA	<0.0010 HTA	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0028	0.0022	<0.0020	<0.0020	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		308	307	<0.30	<0.30	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		<0.50	<0.50	<0.50	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LCUT_WS_LAEMP_LCO_2022-09_N	RG_RIVER_WS_LAEMP_LCO_2022-09_N	RG_FBLANK_WS_LAEMP_LCO_2022-09_N	RG_TRIP_WS_LAEMP_LCO_2022-09_N	----
					Client sampling date / time	15-Sep-2022 11:30	15-Sep-2022 11:30	15-Sep-2022 11:30	15-Sep-2022 11:30	----
						CG2212821-001	CG2212821-002	CG2212821-003	CG2212821-004	--------
						Result	Result	Result	Result	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		12.2	12.3	<0.10	<0.10	----
cation sum	----	EC101	0.10	meq/L		11.2	11.2	<0.10	<0.10	----
ion balance (cations/anions)	----	EC101	0.010	%		91.8	91.0	100	100	----
ion balance (APHA)	----	EC101	0.010	%		4.27	4.68	<0.010	<0.010	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0044	0.0050	<0.0030	<0.0030	----
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00033	0.00034	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00013	0.00017	<0.00010	<0.00010	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0542	0.0550	<0.00010	<0.00010	----
beryllium, total	7440-41-7	E420	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.020	0.021	<0.010	<0.010	----
cadmium, total	7440-43-9	E420	0.0050	µg/L		0.514	0.508	<0.0050	<0.0050	----
calcium, total	7440-70-2	E420	0.050	mg/L		114	114	<0.050	<0.050	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00020	0.00011	<0.00010	<0.00010	----
cobalt, total	7440-48-4	E420	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0734	0.0717	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		57.6	58.2	<0.0050	<0.0050	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00020	0.00015	<0.00010	<0.00010	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00176	0.00171	<0.000050	<0.000050	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.0125	0.0125	<0.00050	<0.00050	----
potassium, total	7440-09-7	E420	0.050	mg/L		1.83	1.83	<0.050	<0.050	----
selenium, total	7782-49-2	E420	0.050	µg/L		62.4	62.7	<0.050	<0.050	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.24	2.26	<0.10	<0.10	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		10.1	10.0	<0.050	<0.050	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LCUT_WS_LAEMP_LCO_2022-09_N	RG_RIVER_WS_LAEMP_LCO_2022-09_N	RG_FBLANK_WS_LAEMP_LCO_2022-09_N	RG_TRIP_WS_LAEMP_LCO_2022-09_N	----
					Client sampling date / time	15-Sep-2022 11:30	15-Sep-2022 11:30	15-Sep-2022 11:30	15-Sep-2022 11:30	----
						CG2212821-001	CG2212821-002	CG2212821-003	CG2212821-004	--------
						Result	Result	Result	Result	----
Total Metals										
strontium, total	7440-24-6	E420	0.00020	mg/L		0.244	0.240	<0.00020	<0.00020	----
sulfur, total	7704-34-9	E420	0.50	mg/L		112	111	<0.50	<0.50	----
thallium, total	7440-28-0	E420	0.000010	mg/L		0.000018	0.000019	<0.000010	<0.000010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00391	0.00401	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0204	0.0206	<0.0030	<0.0030	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00036	0.00035	<0.00010	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0573	0.0578	<0.00010	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.019	0.020	<0.010	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.530	0.554	<0.0050	<0.0050	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		118	117	<0.050	<0.050	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		0.00012	0.00012	<0.00010	<0.00010	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00034	0.00040	<0.00020	<0.00020	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0712	0.0724	<0.0010	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		59.5	59.0	<0.0050	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00012	0.00013	<0.00010	<0.00010	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00184	0.00181	<0.000050	0.000085 RRV	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.0121	0.0124	<0.00050	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.84	1.81	<0.050	<0.050	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LCUT_WS_LAEMP_LCO_2022-09_N	RG_RIVER_WS_LAEMP_LCO_2022-09_N	RG_FBLANK_WS_LAEMP_LCO_2022-09_N	RG_TRIP_WS_LAEMP_LCO_2022-09_N	----
					Client sampling date / time	15-Sep-2022 11:30	15-Sep-2022 11:30	15-Sep-2022 11:30	15-Sep-2022 11:30	----
						CG2212821-001	CG2212821-002	CG2212821-003	CG2212821-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
selenium, dissolved	7782-49-2	E421	0.050	µg/L		72.8	71.9	<0.050	<0.050	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.29	2.20	<0.050	<0.050	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		9.78	9.83	<0.050	<0.050	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.254	0.249	<0.00020	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		110	106	<0.50	<0.50	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		0.000020	0.000021	<0.000010	<0.000010	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00413	0.00412	<0.000010	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0220	0.0214	<0.0010	<0.0010	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2212821**	Page	: 1 of 20
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 17-Sep-2022 11:38
PO	: VPO00816101	Issue Date	: 22-Sep-2022 14:25
C-O-C number	: REP_LAEM_LCO_2022-09_ALS		
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E298	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-09_N	E298	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-09_N	E298	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-09_N	E298	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E235.Br-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-09_N	E235.Br-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-09_N	E235.Br-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E235.Br-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E235.Cl-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E235.Cl-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E235.Cl-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E235.Cl-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E378-U	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	3 days	5 days	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E378-U	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	3 days	5 days	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E378-U	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	3 days	5 days	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E378-U	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	3 days	5 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E235.F	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E235.F	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E235.F	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E235.F	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E235.NO3-L	15-Sep-2022	20-Sep-2022	3 days	5 days	× EHT	20-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E235.NO3-L	15-Sep-2022	20-Sep-2022	3 days	5 days	× EHT	20-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E235.NO3-L	15-Sep-2022	20-Sep-2022	3 days	5 days	× EHT	20-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E235.NO3-L	15-Sep-2022	20-Sep-2022	3 days	5 days	× EHT	20-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E235.NO2-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	3 days	5 days	× EHT

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E235.NO2-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E235.NO2-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E235.NO2-L	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	3 days	5 days	× EHT
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E235.SO4	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E235.SO4	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E235.SO4	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E235.SO4	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E318	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_LCUT_WS_LAEMP_LCO_2022-09_N	E318	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-09_N	E318	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-09_N	E318	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E372-U	15-Sep-2022	20-Sep-2022	----	----		21-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-09_N	E372-U	15-Sep-2022	20-Sep-2022	----	----		21-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_RIVER_WS_LAEMP_LCO_2022-09_N	E372-U	15-Sep-2022	20-Sep-2022	----	----		21-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-09_N	E372-U	15-Sep-2022	20-Sep-2022	----	----		21-Sep-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E421.Cr-L	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_LCUT_WS_LAEMP_LCO_2022-09_N	E421.Cr-L	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_RIVER_WS_LAEMP_LCO_2022-09_N	E421.Cr-L	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) RG_TRIP_WS_LAEMP_LCO_2022-09_N	E421.Cr-L	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E509	15-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LCUT_WS_LAEMP_LCO_2022-09_N	E509	15-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_RIVER_WS_LAEMP_LCO_2022-09_N	E509	15-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E421	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_LCUT_WS_LAEMP_LCO_2022-09_N	E421	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_RIVER_WS_LAEMP_LCO_2022-09_N	E421	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_TRIP_WS_LAEMP_LCO_2022-09_N	E421	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E358-L	15-Sep-2022	20-Sep-2022	----	----		21-Sep-2022	28 days	5 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LCUT_WS_LAEMP_LCO_2022-09_N	E358-L	15-Sep-2022	20-Sep-2022	----	----		21-Sep-2022	28 days	5 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_RIVER_WS_LAEMP_LCO_2022-09_N	E358-L	15-Sep-2022	20-Sep-2022	----	----		21-Sep-2022	28 days	5 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E355-L	15-Sep-2022	20-Sep-2022	----	----		21-Sep-2022	28 days	5 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LCUT_WS_LAEMP_LCO_2022-09_N	E355-L	15-Sep-2022	20-Sep-2022	----	----		21-Sep-2022	28 days	5 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_RIVER_WS_LAEMP_LCO_2022-09_N	E355-L	15-Sep-2022	20-Sep-2022	----	----		21-Sep-2022	28 days	5 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_TRIP_WS_LAEMP_LCO_2022-09_N	E355-L	15-Sep-2022	20-Sep-2022	----	----		21-Sep-2022	28 days	5 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E283	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	14 days	5 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E283	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	14 days	5 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E283	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	14 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Acidity by Titration										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E283	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E290	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E290	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E290	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E290	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	14 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E100	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E100	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E100	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E100	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	28 days	5 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : ORP by Electrode										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E125	15-Sep-2022	----	----	----		21-Sep-2022	0.25 hrs	151 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E125	15-Sep-2022	----	----	----		21-Sep-2022	0.25 hrs	151 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E125	15-Sep-2022	----	----	----		21-Sep-2022	0.25 hrs	151 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E125	15-Sep-2022	----	----	----		21-Sep-2022	0.25 hrs	151 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E108	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	0.25 hrs	0.28 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E108	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	0.25 hrs	0.28 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E108	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	0.25 hrs	0.28 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E108	15-Sep-2022	20-Sep-2022	----	----		20-Sep-2022	0.25 hrs	0.28 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E162	15-Sep-2022	----	----	----		21-Sep-2022	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E162	15-Sep-2022	----	----	----		21-Sep-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E162	15-Sep-2022	----	----	----		21-Sep-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E162	15-Sep-2022	----	----	----		21-Sep-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E160-L	15-Sep-2022	----	----	----		21-Sep-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E160-L	15-Sep-2022	----	----	----		21-Sep-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E160-L	15-Sep-2022	----	----	----		21-Sep-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E160-L	15-Sep-2022	----	----	----		21-Sep-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E121	15-Sep-2022	----	----	----		20-Sep-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-09_N	E121	15-Sep-2022	----	----	----		20-Sep-2022	3 days	5 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-09_N	E121	15-Sep-2022	----	----	----		20-Sep-2022	3 days	5 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE RG_TRIP_WS_LAEMP_LCO_2022-09_N	E121	15-Sep-2022	----	----	----		20-Sep-2022	3 days	5 days	× EHT
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E420.Cr-L	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_LCUT_WS_LAEMP_LCO_2022-09_N	E420.Cr-L	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_RIVER_WS_LAEMP_LCO_2022-09_N	E420.Cr-L	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_TRIP_WS_LAEMP_LCO_2022-09_N	E420.Cr-L	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E508	15-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LCUT_WS_LAEMP_LCO_2022-09_N	E508	15-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_RIVER_WS_LAEMP_LCO_2022-09_N	E508	15-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
RG_TRIP_WS_LAEMP_LCO_2022-09_N	E508	15-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_FBLANK_WS_LAEMP_LCO_2022-09_N	E420	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_LCUT_WS_LAEMP_LCO_2022-09_N	E420	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_RIVER_WS_LAEMP_LCO_2022-09_N	E420	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_TRIP_WS_LAEMP_LCO_2022-09_N	E420	15-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	6 days	✓

Legend & Qualifier Definitions

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

EHT: Exceeded ALS recommended hold time prior to analysis.

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	656371	1	8	12.5	5.0	✓
Alkalinity Species by Titration	E290	656374	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	656499	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	656409	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	656405	1	20	5.0	5.0	✓
Conductivity in Water	E100	656373	1	13	7.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	656670	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	659465	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	656671	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	656575	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	656519	2	29	6.9	5.0	✓
Fluoride in Water by IC	E235.F	656404	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	656406	2	23	8.7	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	656407	1	20	5.0	5.0	✓
ORP by Electrode	E125	657900	1	20	5.0	5.0	✓
pH by Meter	E108	656372	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	656410	1	7	14.2	5.0	✓
TDS by Gravimetry	E162	658682	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	656527	1	15	6.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	656663	1	4	25.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659455	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	656528	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	656576	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	656497	1	11	9.0	5.0	✓
Turbidity by Nephelometry	E121	656605	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	656371	1	8	12.5	5.0	✓
Alkalinity Species by Titration	E290	656374	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	656499	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	656409	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	656405	1	20	5.0	5.0	✓
Conductivity in Water	E100	656373	1	13	7.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	656670	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	659465	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	656671	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	656575	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	656519	2	29	6.9	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	656404	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	656406	2	23	8.7	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	656407	1	20	5.0	5.0	✓
ORP by Electrode	E125	657900	1	20	5.0	5.0	✓
pH by Meter	E108	656372	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	656410	1	7	14.2	5.0	✓
TDS by Gravimetry	E162	658682	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	656527	1	15	6.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	656663	1	4	25.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659455	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	656528	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	656576	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	656497	1	11	9.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	658679	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	656605	1	20	5.0	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	656371	1	8	12.5	5.0	✓
Alkalinity Species by Titration	E290	656374	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	656499	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	656409	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	656405	1	20	5.0	5.0	✓
Conductivity in Water	E100	656373	1	13	7.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	656670	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	659465	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	656671	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	656575	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	656519	2	29	6.9	5.0	✓
Fluoride in Water by IC	E235.F	656404	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	656406	2	23	8.7	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	656407	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	656410	1	7	14.2	5.0	✓
TDS by Gravimetry	E162	658682	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	656527	1	15	6.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	656663	1	4	25.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659455	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	656528	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	656576	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	656497	1	11	9.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	658679	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	656605	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	656499	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	656409	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	656405	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	656670	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	659465	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	656671	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	656575	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	656519	2	29	6.9	5.0	✓
Fluoride in Water by IC	E235.F	656404	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	656406	2	23	8.7	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	656407	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	656410	1	7	14.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	656527	1	15	6.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	656663	1	4	25.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659455	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	656528	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	656576	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	656497	1	11	9.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Calgary - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2212821**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 17-Sep-2022 11:38
PO	: VPO00816101	Date Analysis Commenced	: 20-Sep-2022
C-O-C number	: REP_LAEM_LCO_2022-09_ALS	Issue Date	: 22-Sep-2022 14:25
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Calgary Inorganics, Calgary, Alberta
Anthony Calero	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Mackenzie Lamoureux	Laboratory Analyst	Calgary Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Calgary Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Calgary Inorganics, Calgary, Alberta
Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Summie Lo	Lab Assistant	Calgary Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Calgary Inorganics, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 656371)											
CG2212819-001	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	8.1	6.4	1.7	Diff <2x LOR	----
Physical Tests (QC Lot: 656372)											
CG2212658-001	Anonymous	pH	----	E108	0.10	pH units	8.20	8.24	0.487%	4%	----
Physical Tests (QC Lot: 656373)											
CG2212658-001	Anonymous	conductivity	----	E100	2.0	µS/cm	514	512	0.390%	10%	----
Physical Tests (QC Lot: 656374)											
CG2212658-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	144	142	1.39%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	144	142	1.39%	20%	----
Physical Tests (QC Lot: 656605)											
CG2212821-001	RG_LCUT_WS_LAEMP_LCO_2022-09_N	turbidity	----	E121	0.10	NTU	0.22	0.19	0.03	Diff <2x LOR	----
Physical Tests (QC Lot: 657900)											
CG2212821-001	RG_LCUT_WS_LAEMP_LCO_2022-09_N	oxidation-reduction potential [ORP]	----	E125	0.10	mV	283	282	0.425%	15%	----
Physical Tests (QC Lot: 658682)											
CG2212792-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	644	636	1.09%	20%	----
Anions and Nutrients (QC Lot: 656404)											
CG2212694-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.076	0.076	0.0009	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 656405)											
CG2212694-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	7.11	7.14	0.357%	20%	----
Anions and Nutrients (QC Lot: 656406)											
CG2212694-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.109	0.111	1.46%	20%	----
Anions and Nutrients (QC Lot: 656407)											
CG2212694-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 656409)											
CG2212694-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 656410)											
CG2212812-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	17.3	17.3	0.248%	20%	----
Anions and Nutrients (QC Lot: 656411)											
CG2212821-002	RG_RIVER_WS_LAEMP_LCO_2022-09_N	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	14.3	14.1	1.85%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 656497)											
CG2212779-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0092	0.0076	0.0017	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 656499)											
CG2212779-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0238	0.0232	0.0006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 656519)											
CG2212694-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0015	0.0015	0.00001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 656520)											
CG2212821-003	RG_FBLANK_WS_LAEMP_LCO_2022-09_N	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 656663)											
CG2212821-001	RG_LCUT_WS_LAEMP_LCO_2022-09_N	Kjeldahl nitrogen, total [TKN]	----	E318	0.500	mg/L	1.34	1.15	0.188	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 656575)											
CG2212821-001	RG_LCUT_WS_LAEMP_LCO_2022-09_N	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 656576)											
CG2212821-001	RG_LCUT_WS_LAEMP_LCO_2022-09_N	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 656527)											
CG2212779-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00022	0.00021	0.00002	Diff <2x LOR	----
Total Metals (QC Lot: 656528)											
CG2212779-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0516	0.0504	2.50%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00030	0.00031	0.00001	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00021	0.00022	0.000003	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0503	0.0504	0.176%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.017	0.017	0.0002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0812 µg/L	0.0000796	2.02%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	50.9	49.9	1.91%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.41 µg/L	0.00043	0.00002	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00064	0.00069	0.00006	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.090	0.088	0.002	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000121	0.000122	0.0000009	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0199	0.0195	2.00%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	23.2	23.4	0.885%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00470	0.00496	5.42%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00134	0.00138	2.35%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 656528) - continued											
CG2212779-001	Anonymous	nickel, total	7440-02-0	E420	0.00050	mg/L	0.00605	0.00613	1.31%	20%	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.21	1.22	0.764%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	9.52 µg/L	0.00978	2.62%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.65	1.59	3.75%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	2.78	2.81	1.07%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.104	0.106	1.62%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	35.5	35.6	0.289%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000024	0.000019	0.000005	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00073	0.00102	0.00029	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00129	0.00129	0.601%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00059	0.00059	0.0000004	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0046	0.0046	0.00005	Diff <2x LOR	----
Total Metals (QC Lot: 659455)											
CG2212779-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 656670)											
CG2212779-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00013	0.00013	0.000003	Diff <2x LOR	----
Dissolved Metals (QC Lot: 656671)											
CG2212779-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0053	0.0054	0.00006	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00030	0.00030	0.000006	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00012	0.00015	0.00004	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0496	0.0496	0.0986%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.016	0.017	0.0002	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0631 µg/L	0.0000666	5.35%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	50.8	50.3	0.983%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.26 µg/L	0.00024	0.00002	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00041	0.00043	0.00002	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0204	0.0198	2.66%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	23.4	23.1	1.15%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00105	0.00114	7.95%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 656671) - continued											
CG2212779-001	Anonymous	molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00142	0.00141	0.615%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00533	0.00539	1.11%	20%	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.16	1.16	0.0793%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	10.5 µg/L	0.0108	3.04%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.60	1.58	1.15%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	2.70	2.66	1.44%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.108	0.108	0.0525%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	35.6	35.4	0.487%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000015	0.000015	0.0000003	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00132	0.00129	1.94%	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	0.0033	0.0033	0.00001	Diff <2x LOR	----
Dissolved Metals (QC Lot: 659465)											
CG2212779-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 656371)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 656373)						
conductivity	----	E100	1	µS/cm	1.4	----
Physical Tests (QCLot: 656374)						
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: 656605)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 658679)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 658682)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 656404)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 656405)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 656406)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 656407)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 656409)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 656410)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 656411)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 656497)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 656499)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 656519)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 656519) - continued						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 656520)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 656663)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 656575)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 656576)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 656527)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 656528)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 656528) - continued						
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
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	----
Total Metals (QCLot: 659455)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 656670)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 656671)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 656671) - continued						
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
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	----
Dissolved Metals (QCLot: 659465)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 656371)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	106	85.0	115	----
Physical Tests (QCLot: 656372)									
pH	----	E108	----	pH units	7 pH units	101	98.6	101	----
Physical Tests (QCLot: 656373)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	98.8	90.0	110	----
Physical Tests (QCLot: 656374)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	103	85.0	115	----
Physical Tests (QCLot: 656605)									
turbidity	----	E121	0.1	NTU	200 NTU	110	85.0	115	----
Physical Tests (QCLot: 657900)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	102	95.4	104	----
Physical Tests (QCLot: 658679)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	98.4	85.0	115	----
Physical Tests (QCLot: 658682)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	97.8	85.0	115	----
Anions and Nutrients (QCLot: 656404)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 656405)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 656406)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 656407)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 656409)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 656410)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 656411)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 656497)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 656499)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 656499) - continued									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 656519)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 656520)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Anions and Nutrients (QCLot: 656663)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	103	75.0	125	----
Organic / Inorganic Carbon (QCLot: 656575)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	91.8	80.0	120	----
Organic / Inorganic Carbon (QCLot: 656576)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	98.8	80.0	120	----
Total Metals (QCLot: 656527)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	92.7	80.0	120	----
Total Metals (QCLot: 656528)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	93.1	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	97.6	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	94.0	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	95.8	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	95.7	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	92.8	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	94.6	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	91.3	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	91.8	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	90.4	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	104	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.1	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	106	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	93.9	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	90.3	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.4	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	90.9	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	96.9	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	92.4	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	101	60.0	140	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 656528) - continued									
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	84.7	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	96.3	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	96.0	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	94.5	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	95.6	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	96.8	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	98.2	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	88.7	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	95.2	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	91.1	80.0	120	----
Total Metals (QCLot: 659455)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	93.9	80.0	120	----
Dissolved Metals (QCLot: 656670)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	92.9	80.0	120	----
Dissolved Metals (QCLot: 656671)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	94.6	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	97.8	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	95.4	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	94.3	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	96.4	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.9	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	92.8	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	94.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	92.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	103	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	101	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	94.0	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	95.6	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	100	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	92.0	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	97.0	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	92.3	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	101	60.0	140	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 656671) - continued									
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	86.9	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	99.1	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	105	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	97.7	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	93.5	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	91.0	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	93.3	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	95.1	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.0	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	86.2	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 656404)										
CG2212694-013	Anonymous	fluoride	16984-48-8	E235.F	0.980 mg/L	1 mg/L	98.0	75.0	125	----
Anions and Nutrients (QCLot: 656405)										
CG2212694-013	Anonymous	chloride	16887-00-6	E235.Cl-L	96.2 mg/L	100 mg/L	96.2	75.0	125	----
Anions and Nutrients (QCLot: 656406)										
CG2212694-013	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.42 mg/L	2.5 mg/L	96.7	75.0	125	----
Anions and Nutrients (QCLot: 656407)										
CG2212694-013	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.490 mg/L	0.5 mg/L	97.9	75.0	125	----
Anions and Nutrients (QCLot: 656409)										
CG2212694-013	Anonymous	bromide	24959-67-9	E235.Br-L	0.489 mg/L	0.5 mg/L	97.7	75.0	125	----
Anions and Nutrients (QCLot: 656410)										
CG2212818-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 656411)										
CG2212821-003	RG_FBLANK_WS_LAEMP_LCO_2022-09_N	nitrate (as N)	14797-55-8	E235.NO3-L	2.37 mg/L	2.5 mg/L	94.6	75.0	125	----
Anions and Nutrients (QCLot: 656497)										
CG2212818-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0448 mg/L	0.05 mg/L	89.6	70.0	130	----
Anions and Nutrients (QCLot: 656499)										
CG2212792-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.112 mg/L	0.1 mg/L	112	75.0	125	----
Anions and Nutrients (QCLot: 656519)										
CG2212694-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0525 mg/L	0.05 mg/L	105	70.0	130	----
Anions and Nutrients (QCLot: 656520)										
CG2212821-004	RG_TRIP_WS_LAEMP_LCO_2022-09_N	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0552 mg/L	0.05 mg/L	110	70.0	130	----
Anions and Nutrients (QCLot: 656663)										
CG2212821-002	RG_RIVER_WS_LAEMP_LCO_2022-09_N	Kjeldahl nitrogen, total [TKN]	----	E318	2.52 mg/L	2.5 mg/L	101	70.0	130	----
Organic / Inorganic Carbon (QCLot: 656575)										
CG2212821-001	RG_LCUT_WS_LAEMP_LCO_2022-09_N	carbon, dissolved organic [DOC]	----	E358-L	5.07 mg/L	5 mg/L	101	70.0	130	----
Organic / Inorganic Carbon (QCLot: 656576)										

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
Organic / Inorganic Carbon (QCLot: 656576) - continued										
CG2212821-001	RG_LCUT_WS_LAEMP_LCO_2022-09_N	carbon, total organic [TOC]	----	E355-L	4.87 mg/L	5 mg/L	97.5	70.0	130	----
Total Metals (QCLot: 656527)										
CG2212792-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.376 mg/L	0.4 mg/L	94.1	70.0	130	----
Total Metals (QCLot: 656528)										
CG2212792-001	Anonymous	aluminum, total	7429-90-5	E420	1.83 mg/L	2 mg/L	91.7	70.0	130	----
		antimony, total	7440-36-0	E420	0.183 mg/L	0.2 mg/L	91.6	70.0	130	----
		arsenic, total	7440-38-2	E420	0.193 mg/L	0.2 mg/L	96.6	70.0	130	----
		barium, total	7440-39-3	E420	0.199 mg/L	0.2 mg/L	99.6	70.0	130	----
		beryllium, total	7440-41-7	E420	0.382 mg/L	0.4 mg/L	95.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0927 mg/L	0.1 mg/L	92.7	70.0	130	----
		boron, total	7440-42-8	E420	0.951 mg/L	1 mg/L	95.1	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.193 mg/L	0.2 mg/L	96.6	70.0	130	----
		copper, total	7440-50-8	E420	0.194 mg/L	0.2 mg/L	97.1	70.0	130	----
		iron, total	7439-89-6	E420	19.6 mg/L	20 mg/L	97.8	70.0	130	----
		lead, total	7439-92-1	E420	0.186 mg/L	0.2 mg/L	93.0	70.0	130	----
		lithium, total	7439-93-2	E420	1.01 mg/L	1 mg/L	101	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.180 mg/L	0.2 mg/L	89.9	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.197 mg/L	0.2 mg/L	98.7	70.0	130	----
		nickel, total	7440-02-0	E420	0.392 mg/L	0.4 mg/L	98.0	70.0	130	----
		potassium, total	7440-09-7	E420	39.2 mg/L	40 mg/L	98.1	70.0	130	----
		selenium, total	7782-49-2	E420	0.380 mg/L	0.4 mg/L	95.1	70.0	130	----
		silicon, total	7440-21-3	E420	94.7 mg/L	100 mg/L	94.7	70.0	130	----
		silver, total	7440-22-4	E420	0.0384 mg/L	0.04 mg/L	96.0	70.0	130	----
		sodium, total	7440-23-5	E420	18.2 mg/L	20 mg/L	91.2	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	197 mg/L	200 mg/L	98.5	70.0	130	----
		thallium, total	7440-28-0	E420	0.0358 mg/L	0.04 mg/L	89.5	70.0	130	----
		tin, total	7440-31-5	E420	0.183 mg/L	0.2 mg/L	91.7	70.0	130	----
		titanium, total	7440-32-6	E420	0.395 mg/L	0.4 mg/L	98.7	70.0	130	----
		uranium, total	7440-61-1	E420	0.0373 mg/L	0.04 mg/L	93.2	70.0	130	----
		vanadium, total	7440-62-2	E420	0.964 mg/L	1 mg/L	96.4	70.0	130	----
		zinc, total	7440-66-6	E420	3.92 mg/L	4 mg/L	98.1	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 659455)										
CG2212792-001	Anonymous	mercury, total	7439-97-6	E508	0.000100 mg/L	0.0001 mg/L	100	70.0	130	----
Dissolved Metals (QCLot: 656670)										
CG2212792-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.375 mg/L	0.4 mg/L	93.8	70.0	130	----
Dissolved Metals (QCLot: 656671)										
CG2212792-001	Anonymous	aluminum, dissolved	7429-90-5	E421	1.92 mg/L	2 mg/L	96.1	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.185 mg/L	0.2 mg/L	92.5	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.181 mg/L	0.2 mg/L	90.5	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.188 mg/L	0.2 mg/L	94.2	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.367 mg/L	0.4 mg/L	91.7	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0893 mg/L	0.1 mg/L	89.3	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.970 mg/L	1 mg/L	97.0	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0398 mg/L	0.04 mg/L	99.6	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.190 mg/L	0.2 mg/L	95.0	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.193 mg/L	0.2 mg/L	96.5	70.0	130	----
		iron, dissolved	7439-89-6	E421	18.8 mg/L	20 mg/L	94.1	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.178 mg/L	0.2 mg/L	89.1	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.985 mg/L	1 mg/L	98.5	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.168 mg/L	0.2 mg/L	84.3	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.199 mg/L	0.2 mg/L	99.3	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.368 mg/L	0.4 mg/L	92.1	70.0	130	----
		potassium, dissolved	7440-09-7	E421	37.2 mg/L	40 mg/L	93.0	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.386 mg/L	0.4 mg/L	96.5	70.0	130	----
		silicon, dissolved	7440-21-3	E421	92.8 mg/L	100 mg/L	92.8	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0377 mg/L	0.04 mg/L	94.3	70.0	130	----
		sodium, dissolved	7440-23-5	E421	17.8 mg/L	20 mg/L	89.0	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	190 mg/L	200 mg/L	95.3	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0348 mg/L	0.04 mg/L	87.0	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.185 mg/L	0.2 mg/L	92.6	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.379 mg/L	0.4 mg/L	94.8	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0359 mg/L	0.04 mg/L	89.7	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.947 mg/L	1 mg/L	94.7	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.98 mg/L	4 mg/L	99.5	70.0	130	----
Dissolved Metals (QCLot: 659465)										

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: 659465) - continued										
CG2212792-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000920 mg/L	0.0001 mg/L	92.0	70.0	130	----

Teck

COC ID: REP_LAEMP_LCO_2022-09_ALS

TURNAROUND TIME: 2-3 Business Days

RUSH: Priorty

Environmental Division Calgary Work Order Reference CG2212821

PROJECT/CLIENT INFO

Facility Name / Job#	Regional Effects Program
Project Manager	Cybele Heddle
Email	Cybele.Heddle@teck.com
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LABORATORY

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City	Calgary
Province	AB
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OTHER INFO

Report Format / Distribution		Excel	PDF	EDD
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Email 2:	teckcoal@equisonline.com			X
Email 3:	Teck.Lab.Results@teck.com	X	X	X
Email 4:	Lisa.Bowron@minnow.ca	X	X	X
Email 5:	Tyler.Mehler@minnow.ca	X	X	X
Email 6:	Hannah.Penner@Teck.com	X	X	X
PO number	VPO00816101			

SAMPLE DETAILS

Environmental Division Calgary Work Order Reference CG2212821

Telephone : +1 403 407 1800

ANALYSIS REQUESTED

Filtered - F: Field, L: Lab, FL: Field & Lab, N: Non

	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIR	F	F	N	F	N	N	N					
PRESERV.									H2SO4	HCL	HCL				H2SO4					
ANALYSIS									DOC	Mercury_Dissolved	Mercury_Total	TECKCOAL_METNHG_D	TECKCOAL_METNHG_T	TECKCOAL_ROUTINE	TOC_TKN_PT					
RG_LCUT_WS_LAEMP_LCO_2022-09_N	RG_LCUT	WS		2022/09/15	11:30	G	7		1	1	1	1	1	1	1					
RG_RIVER_WS_LAEMP_LCO_2022-09_N	RG_RIVER	WS		2022/09/15	11:30	G	7		1	1	1	1	1	1	1					
RG_FBLANK_WS_LAEMP_LCO_2022-09_N	RG_FBLANK	WS		2022/09/15	11:30	G	7		1	1	1	1	1	1	1					
RG_TRIP_WS_LAEMP_LCO_2022-09_N	RG_TRIP	WS		2022/09/15	11:30	G	4				1		1	1	1					

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

Dissolved metals were field filtered and to be lab preserved
Total metals to be lab preserved

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Jennifer Ings/Minnow	##########	Seema	09-17 1138AM

SERVICE REQUEST (rush - subject to availability)

Regular (default)	
Priority (2-3 business days) - 50% surcharge	X
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	5195003444
Sampler's Signature		Date/Time	September 16, 2022

Environmental Division Calgary Work Order Reference CG2212821

WATER CHEMISTRY

ALS Laboratory Report CG2216667
(Finalized December 6, 2022)

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **CG2216667**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 30-Nov-2022 09:55
PO	: VPO00816101	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: REP_LAEMP_LCO_2022_December_AL	Issue Date	: 06-Dec-2022 14:21
Sampler	: RS		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Kevin Baxter	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Baxter	Team Leader - Inorganics	Metals, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Sonthuong Bui	Laboratory Analyst	Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta
Zakieh Lalonde		Metals, Calgary, Alberta

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLIS	*Detection Limit Adjusted due to insufficient sample.*
DTSE	*Dissolved Se concentration exceeds total. Positive bias on D-Se suspected due to signal enhancement from volatile selenium species. Contact ALS if an alternative test to address this interference is needed.*
RRV	*Reported result verified by repeat analysis.*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FRUL_WS_LCO_LAEMP_2022-12_N	RG_LIDSL_WS_LCO_LAEMP_2022-12_N	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	RG_TRIP_WS_LCO_LAEMP_2022-12_NP	----
					Client sampling date / time	29-Nov-2022 09:30	29-Nov-2022 13:30	29-Nov-2022 12:30	29-Nov-2022 12:00	----
						CG2216667-001	CG2216667-002	CG2216667-003	CG2216667-004	--------
						Result	Result	Result	Result	----
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	<2.0	<2.0	2.2 RRV	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		197	195	<1.0	<1.0	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		240	238	<1.0	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		7.2	4.4	<1.0	<1.0	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		4.3	2.6	<1.0	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		204	199	<1.0	<1.0	----
conductivity	----	E100	2.0	µS/cm		815	933	<2.0	<2.0	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		497	538	<0.50	<0.50	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV		437	401	454	549	----
pH	----	E108	0.10	pH units		8.33	8.29	5.61	5.25	----
solids, total dissolved [TDS]	----	E162	10	mg/L		597	682	<10	<10	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		<1.5 DLIS	1.4	<1.0	<1.0	----
turbidity	----	E121	0.10	NTU		0.52	0.16	<0.10	<0.10	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		4.67	15.2	<0.10	<0.10	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.177	0.222	<0.020	<0.020	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.376 TKNI	0.739 TKNI	<0.050	<0.050	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		12.8	8.74	<0.0050	<0.0050	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0024	0.0013	<0.0010	<0.0010	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		<0.0020	0.0025	<0.0020	<0.0020	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		231	301	<0.30	<0.30	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		<0.50	<0.50	<0.50	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_FRUL_WS_LCO_LAEMP_2022-12_N	RG_LIDSL_WS_LCO_LAEMP_2022-12_N	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	RG_TRIP_WS_LCO_LAEMP_2022-12_NP	----
Client sampling date / time					29-Nov-2022 09:30	29-Nov-2022 13:30	29-Nov-2022 12:30	29-Nov-2022 12:00	----
					CG2216667-001	CG2216667-002	CG2216667-003	CG2216667-004	--------
					Result	Result	Result	Result	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	<0.50	<0.50	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	9.94	11.3	<0.10	<0.10	----
cation sum	----	EC101	0.10	meq/L	10.1	11.2	<0.10	<0.10	----
ion balance (cations/anions)	----	EC101	0.010	%	102	99.1	100	100	----
ion balance (APHA)	----	EC101	0.01	%	0.80	-0.44	<0.01	<0.01	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0030	0.0033	<0.0030	<0.0030	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00010	0.00027	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	0.00011	<0.00010	<0.00010	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0938	0.0586	<0.00010	0.00017 RRV	----
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	<0.020	<0.020	<0.020	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	0.014	<0.010	<0.010	----
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.0083	0.136	<0.0050	<0.0050	----
calcium, total	7440-70-2	E420	0.050	mg/L	100	118	<0.050	<0.050	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00011	0.00013	<0.00010	<0.00010	----
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0240	0.0482	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	46.2	60.5	<0.0050	<0.0050	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00031	0.00445	<0.00010	<0.00010	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000883	0.00297	<0.000050	<0.000050	----
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	0.00498	<0.00050	<0.00050	----
potassium, total	7440-09-7	E420	0.050	mg/L	1.20	1.62	<0.050	<0.050	----
selenium, total	7782-49-2	E420	0.050	µg/L	46.0 DTSE	46.5 DTSE	<0.050	<0.050	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_FRUL_WS_LCO_LAEMP_2022-12_N	RG_LIDSL_WS_LCO_LAEMP_2022-12_N	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	RG_TRIP_WS_LCO_LAEMP_2022-12_NP	----
Client sampling date / time					29-Nov-2022 09:30	29-Nov-2022 13:30	29-Nov-2022 12:30	29-Nov-2022 12:00	----
					CG2216667-001	CG2216667-002	CG2216667-003	CG2216667-004	--------
					Result	Result	Result	Result	----
Total Metals									
silicon, total	7440-21-3	E420	0.10	mg/L	2.45	2.24	<0.10	<0.10	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L	3.07	9.20	<0.050	<0.050	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.157	0.224	<0.00020	<0.00020	----
sulfur, total	7704-34-9	E420	0.50	mg/L	79.1	124	<0.50	<0.50	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00232	0.00403	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	0.0044	<0.0030	<0.0030	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0018	<0.0010	<0.0010	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	0.00024	<0.00010	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	0.00010	<0.00010	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.103	0.0614	0.00010 RRV	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	<0.020	<0.020	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	0.013	<0.010	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.0088	0.141	<0.0050	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	110	114	<0.050	<0.050	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00011	0.00011	<0.00010	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L	<0.10	<0.10	<0.10	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0258	0.0449	<0.0010	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	53.9	61.4	<0.0050	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00029	0.00399	<0.00010	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FRUL_WS_LCO_LAEMP_2022-12_N	RG_LIDSL_WS_LCO_LAEMP_2022-12_N	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	RG_TRIP_WS_LCO_LAEMP_2022-12_NP	----
					Client sampling date / time	29-Nov-2022 09:30	29-Nov-2022 13:30	29-Nov-2022 12:30	29-Nov-2022 12:00	----
						CG2216667-001	CG2216667-002	CG2216667-003	CG2216667-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000979	0.00296	<0.000050	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	0.00513	<0.00050	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.41	1.68	<0.050	<0.050	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L		70.7 DTSE	63.3 DTSE	<0.050	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.59	2.31	<0.050	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		3.47	9.42	0.107 RRV	<0.050	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.178	0.224	<0.00020	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		100	131	<0.50	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00240	0.00399	<0.000010	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0010	0.0050	<0.0010	----	----
dissolved mercury filtration location	----	EP509	-	-		Laboratory	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Laboratory	----

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

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2216667**	Page	: 1 of 21
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 30-Nov-2022 09:55
PO	: VPO00816101	Issue Date	: 06-Dec-2022 14:21
C-O-C number	: REP_LAEMP_LCO_2022_December_AL		
Sampler	: RS		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- 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 / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E298	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E298	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E298	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (lab preserved) RG_FRUL_WS_LCO_LAEMP_2022-12_N	E298	29-Nov-2022	01-Dec-2022	3 days	2 days	✓	01-Dec-2022	28 days	0 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E235.Br-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E235.Br-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E235.Br-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E235.Br-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E235.Cl-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E235.Cl-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E235.Cl-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E235.Cl-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E378-U	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E378-U	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E378-U	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E378-U	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E235.F	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E235.F	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E235.F	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E235.F	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E235.NO3-L	29-Nov-2022	01-Dec-2022	3 days	2 days	✓	01-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E235.NO3-L	29-Nov-2022	01-Dec-2022	3 days	2 days	✓	01-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E235.NO3-L	29-Nov-2022	01-Dec-2022	3 days	2 days	✓	01-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E235.NO3-L	29-Nov-2022	01-Dec-2022	3 days	2 days	✓	01-Dec-2022	3 days	0 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E235.NO2-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E235.NO2-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E235.NO2-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E235.NO2-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E235.SO4	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E235.SO4	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E235.SO4	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E235.SO4	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E318	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E318	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E318	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (lab preserved)										
RG_FRUL_WS_LCO_LAEMP_2022-12_N	E318	29-Nov-2022	02-Dec-2022	3 days	3 days	✓	02-Dec-2022	28 days	0 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E372-U	29-Nov-2022	01-Dec-2022	----	----		02-Dec-2022	28 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E372-U	29-Nov-2022	02-Dec-2022	----	----		04-Dec-2022	28 days	5 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E372-U	29-Nov-2022	02-Dec-2022	----	----		04-Dec-2022	28 days	5 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (lab preserved)										
RG_FRUL_WS_LCO_LAEMP_2022-12_N	E372-U	29-Nov-2022	02-Dec-2022	3 days	3 days	✓	04-Dec-2022	28 days	2 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E421.Cr-L	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_FRUL_WS_LCO_LAEMP_2022-12_N	E421.Cr-L	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	180 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E421.Cr-L	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E509	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) RG_FRUL_WS_LCO_LAEMP_2022-12_N	E509	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E509	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E421	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_FRUL_WS_LCO_LAEMP_2022-12_N	E421	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E421	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E421	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	180 days	3 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E358-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_FRUL_WS_LCO_LAEMP_2022-12_N	E358-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E358-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E355-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E355-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E355-L	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (lab preserved)										
RG_FRUL_WS_LCO_LAEMP_2022-12_N	E355-L	29-Nov-2022	01-Dec-2022	3 days	2 days	✓	01-Dec-2022	28 days	0 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E283	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_FRUL_WS_LCO_LAEMP_2022-12_N	E283	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E283	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	14 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Acidity by Titration										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E283	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E290	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E290	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E290	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E290	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E100	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E100	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E100	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E100	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : ORP by Electrode										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E125	29-Nov-2022	----	----	----		01-Dec-2022	0.25 hrs	48 hrs	✖ EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E125	29-Nov-2022	----	----	----		01-Dec-2022	0.25 hrs	54 hrs	✖ EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E125	29-Nov-2022	----	----	----		01-Dec-2022	0.25 hrs	54 hrs	✖ EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E125	29-Nov-2022	----	----	----		01-Dec-2022	0.25 hrs	57 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E108	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	0.25 hrs	0.25 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E108	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	0.25 hrs	0.25 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E108	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	0.25 hrs	0.25 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E108	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	0.25 hrs	0.26 hrs	✖ EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E162	29-Nov-2022	----	----	----		01-Dec-2022	7 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E162	29-Nov-2022	----	----	----		03-Dec-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E162	29-Nov-2022	----	----	----		03-Dec-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E162	29-Nov-2022	----	----	----		03-Dec-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E160-L	29-Nov-2022	----	----	----		01-Dec-2022	7 days	2 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E160-L	29-Nov-2022	----	----	----		03-Dec-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E160-L	29-Nov-2022	----	----	----		03-Dec-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E160-L	29-Nov-2022	----	----	----		03-Dec-2022	7 days	4 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E121	29-Nov-2022	----	----	----		01-Dec-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_FRUL_WS_LCO_LAEMP_2022-12_N	E121	29-Nov-2022	----	----	----		01-Dec-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E121	29-Nov-2022	----	----	----		01-Dec-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E121	29-Nov-2022	----	----	----		01-Dec-2022	3 days	2 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E420.Cr-L	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	180 days	3 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E420.Cr-L	29-Nov-2022	02-Dec-2022	----	----		03-Dec-2022	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_FRUL_WS_LCO_LAEMP_2022-12_N	E420.Cr-L	29-Nov-2022	02-Dec-2022	----	----		03-Dec-2022	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E420.Cr-L	29-Nov-2022	02-Dec-2022	----	----		03-Dec-2022	180 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E508	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) RG_FRUL_WS_LCO_LAEMP_2022-12_N	E508	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E508	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E508	29-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	2 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_LIDSL_WS_LCO_LAEMP_2022-12_N	E420	29-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	180 days	3 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	E420	29-Nov-2022	02-Dec-2022	----	----		03-Dec-2022	180 days	4 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_FRUL_WS_LCO_LAEMP_2022-12_N	E420	29-Nov-2022	02-Dec-2022	----	----		03-Dec-2022	180 days	4 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
RG_TRIP_WS_LCO_LAEMP_2022-12_NP	E420	29-Nov-2022	02-Dec-2022	----	----		03-Dec-2022	180 days	4 days	✓

Legend & Qualifier Definitions

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

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	764294	2	33	6.0	5.0	✓
Alkalinity Species by Titration	E290	765261	2	22	9.0	5.0	✓
Ammonia by Fluorescence	E298	764370	2	40	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	764350	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	764351	1	16	6.2	5.0	✓
Conductivity in Water	E100	765260	2	22	9.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	764258	1	5	20.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	764688	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	764257	1	16	6.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	764391	1	13	7.6	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	764520	2	39	5.1	5.0	✓
Fluoride in Water by IC	E235.F	764349	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	764352	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	764353	1	16	6.2	5.0	✓
ORP by Electrode	E125	764439	2	24	8.3	5.0	✓
pH by Meter	E108	765262	2	24	8.3	5.0	✓
Sulfate in Water by IC	E235.SO4	764354	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	764852	2	28	7.1	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	764234	2	4	50.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	764277	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	764628	1	16	6.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	764235	2	4	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	764392	1	14	7.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	765461	1	21	4.7	5.0	×
Turbidity by Nephelometry	E121	764363	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	764294	2	33	6.0	5.0	✓
Alkalinity Species by Titration	E290	765261	2	22	9.0	5.0	✓
Ammonia by Fluorescence	E298	764370	2	40	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	764350	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	764351	1	16	6.2	5.0	✓
Conductivity in Water	E100	765260	2	22	9.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	764258	1	5	20.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	764688	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	764257	1	16	6.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	764391	1	13	7.6	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	764520	2	39	5.1	5.0	✓
Fluoride in Water by IC	E235.F	764349	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	764352	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	764353	1	16	6.2	5.0	✓
ORP by Electrode	E125	764439	2	24	8.3	5.0	✓
pH by Meter	E108	765262	2	24	8.3	5.0	✓
Sulfate in Water by IC	E235.SO4	764354	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	764852	2	28	7.1	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	764234	2	4	50.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	764277	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	764628	1	16	6.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	764235	2	4	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	764392	1	14	7.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	765461	1	21	4.7	5.0	✗
TSS by Gravimetry (Low Level)	E160-L	764853	2	28	7.1	5.0	✓
Turbidity by Nephelometry	E121	764363	1	20	5.0	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	764294	2	33	6.0	5.0	✓
Alkalinity Species by Titration	E290	765261	2	22	9.0	5.0	✓
Ammonia by Fluorescence	E298	764370	2	40	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	764350	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	764351	1	16	6.2	5.0	✓
Conductivity in Water	E100	765260	2	22	9.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	764258	1	5	20.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	764688	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	764257	1	16	6.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	764391	1	13	7.6	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	764520	2	39	5.1	5.0	✓
Fluoride in Water by IC	E235.F	764349	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	764352	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	764353	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	764354	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	764852	2	28	7.1	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	764234	2	4	50.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	764277	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	764628	1	16	6.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	764235	2	4	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	764392	1	14	7.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	765461	1	21	4.7	5.0	✗

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
TSS by Gravimetry (Low Level)	E160-L	764853	2	28	7.1	5.0	✓
Turbidity by Nephelometry	E121	764363	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	764370	2	40	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	764350	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	764351	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	764258	1	5	20.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	764688	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	764257	1	16	6.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	764391	1	13	7.6	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	764520	2	39	5.1	5.0	✓
Fluoride in Water by IC	E235.F	764349	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	764352	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	764353	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	764354	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	764234	1	4	25.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	764277	1	9	11.1	5.0	✓
Total Mercury in Water by CVAAS	E508	764628	1	16	6.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	764235	1	4	25.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	764392	1	14	7.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	765461	1	21	4.7	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 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Calgary - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **CG2216667**	Page	: 1 of 22
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	:	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 30-Nov-2022 09:55
PO	: VPO00816101	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: REP_LAEMP_LCO_2022_December_AL	Issue Date	: 06-Dec-2022 14:21
Sampler	: RS ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Calgary Inorganics, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Kevin Baxter	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Kevin Baxter	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Ruifang Zheng	Analyst	Calgary Inorganics, Calgary, Alberta
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Sonthuong Bui	Laboratory Analyst	Calgary Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Calgary Inorganics, Calgary, Alberta
Zakieh Lalonde		Calgary Metals, Calgary, Alberta

General Comments

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

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts 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: 764294)											
CG2216640-003	Anonymous	acidity (as CaCO3)	----	E283	10.0	mg/L	13.2	12.1	1.1	Diff <2x LOR	----
Physical Tests (QC Lot: 764347)											
CG2216663-001	Anonymous	acidity (as CaCO3)	----	E283	10.0	mg/L	26.8	23.4	3.4	Diff <2x LOR	----
Physical Tests (QC Lot: 764363)											
CG2216603-001	Anonymous	turbidity	----	E121	0.10	NTU	1.39	1.50	7.62%	15%	----
Physical Tests (QC Lot: 764439)											
CG2216667-002	RG_LIDSL_WS_LCO_LAEMP_2022-12_N	oxidation-reduction potential [ORP]	----	E125	0.10	mV	401	403	0.373%	15%	----
Physical Tests (QC Lot: 764519)											
CG2216648-007	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	414	415	0.169%	15%	----
Physical Tests (QC Lot: 764852)											
CG2216656-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	242	230	5.08%	20%	----
Physical Tests (QC Lot: 765145)											
CG2216657-002	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	304	300	1.33%	20%	----
Physical Tests (QC Lot: 765260)											
CG2216656-001	Anonymous	conductivity	----	E100	2.0	µS/cm	387	387	0.00%	10%	----
Physical Tests (QC Lot: 765261)											
CG2216656-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	2.0	mg/L	168	164	2.29%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	168	164	2.29%	20%	----
Physical Tests (QC Lot: 765262)											
CG2216656-001	Anonymous	pH	----	E108	0.10	pH units	8.16	8.19	0.367%	4%	----
Physical Tests (QC Lot: 765266)											
CG2216664-003	Anonymous	pH	----	E108	0.10	pH units	7.63	7.65	0.262%	4%	----
Physical Tests (QC Lot: 765267)											
CG2216664-003	Anonymous	conductivity	----	E100	2.0	µS/cm	3810	3770	1.06%	10%	----
Physical Tests (QC Lot: 765268)											
CG2216664-003	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	644	636	1.31%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	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*
Physical Tests (QC Lot: 765268) - continued											
CG2216664-003	Anonymous	alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	644	636	1.31%	20%	----
Anions and Nutrients (QC Lot: 764277)											
CG2216662-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.50	mg/L	138	144	4.33%	20%	----
Anions and Nutrients (QC Lot: 764349)											
CG2216667-001	RG_FRUL_WS_LCO_LAE MP_2022-12_N	fluoride	16984-48-8	E235.F	0.020	mg/L	0.177	0.178	0.0004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 764350)											
CG2216667-001	RG_FRUL_WS_LCO_LAE MP_2022-12_N	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 764351)											
CG2216667-001	RG_FRUL_WS_LCO_LAE MP_2022-12_N	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	4.67	4.77	2.03%	20%	----
Anions and Nutrients (QC Lot: 764352)											
CG2216667-001	RG_FRUL_WS_LCO_LAE MP_2022-12_N	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	12.8	13.0	2.07%	20%	----
Anions and Nutrients (QC Lot: 764353)											
CG2216667-001	RG_FRUL_WS_LCO_LAE MP_2022-12_N	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0024	0.0022	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 764354)											
CG2216667-001	RG_FRUL_WS_LCO_LAE MP_2022-12_N	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	231	236	2.19%	20%	----
Anions and Nutrients (QC Lot: 764370)											
CG2216664-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.125	mg/L	2.55	2.54	0.400%	20%	----
Anions and Nutrients (QC Lot: 764520)											
CG2216616-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0236	0.0232	1.96%	20%	----
Anions and Nutrients (QC Lot: 764527)											
CG2216628-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0064	0.0062	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 764563)											
CG2216666-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.308	0.307	0.325%	20%	----
Anions and Nutrients (QC Lot: 765461)											
CG2216667-001	RG_FRUL_WS_LCO_LAE MP_2022-12_N	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 764391)											
CG2216665-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 764392)											
CG2216665-001	Anonymous	carbon, total organic [TOC]	----	E355-L	1.00	mg/L	4.15	4.27	0.12	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: 764234)											
CG2216667-002	RG_LIDSL_WS_LCO_LAEMP_2022-12_N	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00013	0.00012	0.00001	Diff <2x LOR	----
Total Metals (QC Lot: 764235)											
CG2216667-002	RG_LIDSL_WS_LCO_LAEMP_2022-12_N	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0033	<0.0030	0.0003	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00027	0.00027	0.0000010	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00011	<0.00010	0.000009	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0586	0.0605	3.18%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.014	0.014	0.0002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.136 µg/L	0.000150	9.91%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	118	114	3.79%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0482	0.0449	6.92%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	60.5	61.7	2.01%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00445	0.00456	2.39%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00297	0.00294	0.877%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00498	0.00518	3.94%	20%	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.62	1.65	1.57%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	46.5 µg/L	0.0474	2.10%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.24	2.23	0.670%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	9.20	9.44	2.57%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.224	0.222	0.787%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	124	122	1.51%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00403	0.00397	1.54%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0044	0.0047	0.0003	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 764628)											
CG2216639-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 765478)											
CG2216667-001	RG_FRUL_WS_LCO_LAEMP_2022-12_N	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00011	0.00014	0.00002	Diff <2x LOR	----
Total Metals (QC Lot: 765479)											
CG2216667-001	RG_FRUL_WS_LCO_LAEMP_2022-12_N	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0030	<0.0030	0.00003	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00010	0.00010	0.00000004	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0938	0.0880	6.41%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0083 µg/L	0.0000055	0.0000028	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	100	93.8	6.50%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0240	0.0226	6.36%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	46.2	43.4	6.05%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00031	0.00021	0.00010	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000883	0.000860	2.58%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.20	1.14	5.16%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	46.0 µg/L	0.0443	3.62%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.45	2.34	4.52%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	3.07	2.87	6.68%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.157	0.149	5.27%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	79.1	75.7	4.33%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00232	0.00219	5.72%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 765479) - continued											
CG2216667-001	RG_FRUL_WS_LCO_LAE MP_2022-12_N	vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 764257)											
CG2216665-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0062	0.0056	0.0006	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00024	0.00024	0.000002	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0984	0.0979	0.514%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.318	0.341	6.97%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0050 µg/L	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	1.91	1.93	0.842%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.426	0.441	3.64%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	0.767	0.741	3.45%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00986	0.00979	0.806%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000147	0.000147	0.00000003	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.671	0.684	1.88%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.052 µg/L	<0.000050	0.000002	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	3.39	3.48	2.54%	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	213	214	0.570%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.156	0.157	0.860%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000024	0.000024	0.0000001	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----

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: 764258)											
CG2216665-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 764688)											
CG2216639-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 764294)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 764347)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 764363)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 764852)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 764853)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 765141)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 765145)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 765260)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 765261)						
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: 765267)						
conductivity	----	E100	1	µS/cm	1.2	----
Physical Tests (QCLot: 765268)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 764277)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 764349)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 764350)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 764350) - continued						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 764351)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 764352)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 764353)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 764354)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 764370)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 764520)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 764527)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 764563)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 765461)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 764391)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 764392)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 764234)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 764235)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 764235) - continued						
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
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	----
Total Metals (QCLot: 764628)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 765478)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 765479)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 765479) - continued						
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
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	----
Dissolved Metals (QCLot: 764257)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 764257) - continued						
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	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
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	----
Dissolved Metals (QCLot: 764258)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 764688)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 764294)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	106	85.0	115	----
Physical Tests (QCLot: 764347)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	108	85.0	115	----
Physical Tests (QCLot: 764363)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 764439)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	100	95.4	104	----
Physical Tests (QCLot: 764519)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	101	95.4	104	----
Physical Tests (QCLot: 764852)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	102	85.0	115	----
Physical Tests (QCLot: 764853)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	94.0	85.0	115	----
Physical Tests (QCLot: 765141)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	91.2	85.0	115	----
Physical Tests (QCLot: 765145)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	90.2	85.0	115	----
Physical Tests (QCLot: 765260)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 765261)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	102	85.0	115	----
Physical Tests (QCLot: 765262)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 765266)									
pH	----	E108	----	pH units	7 pH units	101	98.6	101	----
Physical Tests (QCLot: 765267)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	101	90.0	110	----
Physical Tests (QCLot: 765268)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 764277)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	102	75.0	125	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 764349)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 764350)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	105	85.0	115	----
Anions and Nutrients (QCLot: 764351)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 764352)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 764353)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 764354)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 764370)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 764520)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 764527)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	98.3	80.0	120	----
Anions and Nutrients (QCLot: 764563)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	105	85.0	115	----
Anions and Nutrients (QCLot: 765461)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	98.4	80.0	120	----
Organic / Inorganic Carbon (QCLot: 764391)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	110	80.0	120	----
Organic / Inorganic Carbon (QCLot: 764392)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	113	80.0	120	----
Total Metals (QCLot: 764234)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	99.3	80.0	120	----
Total Metals (QCLot: 764235)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	112	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	98.4	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	98.0	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 764235) - continued									
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.0	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	92.6	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.6	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	97.6	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.7	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	110	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.6	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	108	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	89.9	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	99.4	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	97.6	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	105	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	98.6	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.0	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	93.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	97.4	80.0	120	----
Total Metals (QCLot: 764628)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
Total Metals (QCLot: 765478)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Total Metals (QCLot: 765479)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	103	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	98.6	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	96.1	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	102	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 765479) - continued									
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	88.8	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	94.2	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.9	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	95.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	101	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	103	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	108	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.7	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.9	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	85.0	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	107	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	97.4	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	92.4	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.8	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	100	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	107	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	94.1	80.0	120	----
Dissolved Metals (QCLot: 764257)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	103	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	98.7	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	97.3	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	96.5	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	99.0	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	85.4	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.8	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 764257) - continued									
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.7	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	97.3	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	99.2	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	109	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	105	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.6	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	86.6	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	93.1	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	100	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	107	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	97.5	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.5	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	87.9	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	99.7	80.0	120	----
Dissolved Metals (QCLot: 764258)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	99.1	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	98.9	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 764277)										
CG2216667-001	RG_FRUL_WS_LCO_LAEMP_2022-12_N	Kjeldahl nitrogen, total [TKN]	----	E318	2.33 mg/L	2.5 mg/L	93.1	70.0	130	----
Anions and Nutrients (QCLot: 764349)										
CG2216667-003	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 764350)										
CG2216667-003	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	bromide	24959-67-9	E235.Br-L	0.518 mg/L	0.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 764351)										
CG2216667-003	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	chloride	16887-00-6	E235.Cl-L	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 764352)										
CG2216667-003	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	nitrate (as N)	14797-55-8	E235.NO3-L	2.57 mg/L	2.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 764353)										
CG2216667-003	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	nitrite (as N)	14797-65-0	E235.NO2-L	0.520 mg/L	0.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 764354)										
CG2216667-003	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	sulfate (as SO4)	14808-79-8	E235.SO4	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 764370)										
CG2216664-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 764520)										
CG2216616-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0501 mg/L	0.05 mg/L	100	70.0	130	----
Anions and Nutrients (QCLot: 764527)										
CG2216628-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0514 mg/L	0.05 mg/L	103	70.0	130	----
Anions and Nutrients (QCLot: 764563)										
CG2216666-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 765461)										
CG2216667-003	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	phosphorus, total	7723-14-0	E372-U	0.0476 mg/L	0.05 mg/L	95.2	70.0	130	----
Organic / Inorganic Carbon (QCLot: 764391)										

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
Organic / Inorganic Carbon (QCLot: 764391) - continued										
CG2216665-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	5.08 mg/L	5 mg/L	102	70.0	130	----
Organic / Inorganic Carbon (QCLot: 764392)										
CG2216665-001	Anonymous	carbon, total organic [TOC]	----	E355-L	5.26 mg/L	5 mg/L	105	70.0	130	----
Total Metals (QCLot: 764628)										
CG2216640-010	Anonymous	mercury, total	7439-97-6	E508	0.0000979 mg/L	0.0001 mg/L	97.9	70.0	130	----
Total Metals (QCLot: 765478)										
CG2216667-003	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	chromium, total	7440-47-3	E420.Cr-L	0.438 mg/L	0.4 mg/L	109	70.0	130	----
Total Metals (QCLot: 765479)										
CG2216667-003	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	aluminum, total	7429-90-5	E420	2.14 mg/L	2 mg/L	107	70.0	130	----
		antimony, total	7440-36-0	E420	0.221 mg/L	0.2 mg/L	111	70.0	130	----
		arsenic, total	7440-38-2	E420	0.209 mg/L	0.2 mg/L	105	70.0	130	----
		barium, total	7440-39-3	E420	0.223 mg/L	0.2 mg/L	111	70.0	130	----
		beryllium, total	7440-41-7	E420	0.437 mg/L	0.4 mg/L	109	70.0	130	----
		bismuth, total	7440-69-9	E420	0.115 mg/L	0.1 mg/L	115	70.0	130	----
		boron, total	7440-42-8	E420	0.958 mg/L	1 mg/L	95.8	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0435 mg/L	0.04 mg/L	109	70.0	130	----
		calcium, total	7440-70-2	E420	44.5 mg/L	40 mg/L	111	70.0	130	----
		cobalt, total	7440-48-4	E420	0.218 mg/L	0.2 mg/L	109	70.0	130	----
		copper, total	7440-50-8	E420	0.209 mg/L	0.2 mg/L	104	70.0	130	----
		iron, total	7439-89-6	E420	21.0 mg/L	20 mg/L	105	70.0	130	----
		lead, total	7439-92-1	E420	0.231 mg/L	0.2 mg/L	116	70.0	130	----
		lithium, total	7439-93-2	E420	1.06 mg/L	1 mg/L	106	70.0	130	----
		magnesium, total	7439-95-4	E420	11.8 mg/L	10 mg/L	118	70.0	130	----
		manganese, total	7439-96-5	E420	0.220 mg/L	0.2 mg/L	110	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.209 mg/L	0.2 mg/L	104	70.0	130	----
		nickel, total	7440-02-0	E420	0.442 mg/L	0.4 mg/L	110	70.0	130	----
		potassium, total	7440-09-7	E420	43.6 mg/L	40 mg/L	109	70.0	130	----
		selenium, total	7782-49-2	E420	0.401 mg/L	0.4 mg/L	100	70.0	130	----
		silicon, total	7440-21-3	E420	106 mg/L	100 mg/L	106	70.0	130	----
		silver, total	7440-22-4	E420	0.0484 mg/L	0.04 mg/L	121	70.0	130	----
		sodium, total	7440-23-5	E420	21.7 mg/L	20 mg/L	109	70.0	130	----
		strontium, total	7440-24-6	E420	0.214 mg/L	0.2 mg/L	107	70.0	130	----
		sulfur, total	7704-34-9	E420	195 mg/L	200 mg/L	97.5	70.0	130	----
		thallium, total	7440-28-0	E420	0.0453 mg/L	0.04 mg/L	113	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 765479) - continued										
CG2216667-003	RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	tin, total	7440-31-5	E420	0.216 mg/L	0.2 mg/L	108	70.0	130	----
		titanium, total	7440-32-6	E420	0.433 mg/L	0.4 mg/L	108	70.0	130	----
		uranium, total	7440-61-1	E420	0.0470 mg/L	0.04 mg/L	118	70.0	130	----
		vanadium, total	7440-62-2	E420	1.10 mg/L	1 mg/L	110	70.0	130	----
		zinc, total	7440-66-6	E420	4.25 mg/L	4 mg/L	106	70.0	130	----
Dissolved Metals (QCLot: 764257)										
CG2216665-002	Anonymous	aluminum, dissolved	7429-90-5	E421	1.98 mg/L	2 mg/L	98.9	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.194 mg/L	0.2 mg/L	96.8	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.190 mg/L	0.2 mg/L	94.9	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.160 mg/L	0.2 mg/L	80.0	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.369 mg/L	0.4 mg/L	92.2	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0959 mg/L	0.1 mg/L	95.9	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.862 mg/L	1 mg/L	86.2	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0368 mg/L	0.04 mg/L	91.9	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.193 mg/L	0.2 mg/L	96.4	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.185 mg/L	0.2 mg/L	92.4	70.0	130	----
		iron, dissolved	7439-89-6	E421	17.7 mg/L	20 mg/L	88.4	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.186 mg/L	0.2 mg/L	92.9	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.897 mg/L	1 mg/L	89.7	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.192 mg/L	0.2 mg/L	96.1	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.377 mg/L	0.4 mg/L	94.3	70.0	130	----
		potassium, dissolved	7440-09-7	E421	38.4 mg/L	40 mg/L	95.9	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.363 mg/L	0.4 mg/L	90.8	70.0	130	----
		silicon, dissolved	7440-21-3	E421	83.2 mg/L	100 mg/L	83.2	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		sodium, dissolved	7440-23-5	E421	18.8 mg/L	20 mg/L	93.9	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	191 mg/L	200 mg/L	95.5	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0380 mg/L	0.04 mg/L	95.1	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.179 mg/L	0.2 mg/L	89.7	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.354 mg/L	0.4 mg/L	88.5	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0378 mg/L	0.04 mg/L	94.5	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 764257) - continued										
CG2216665-002	Anonymous	vanadium, dissolved	7440-62-2	E421	0.947 mg/L	1 mg/L	94.7	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.84 mg/L	4 mg/L	96.1	70.0	130	----
Dissolved Metals (QCLot: 764258)										
CG2216665-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.370 mg/L	0.4 mg/L	92.6	70.0	130	----
Dissolved Metals (QCLot: 764688)										
CG2216640-010	Anonymous	mercury, dissolved	7439-97-6	E509	0.000104 mg/L	0.0001 mg/L	104	70.0	130	----

Page 1 of 2

Teck

COC ID:	REP_LAEMP_LCO_2022_December_ALS	TURNAROUND TIME:	Regular	RUSH:	N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1:	aquascilab@teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	2559 29 Street NE			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	hannah.penner@teck.com	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	rhiannon.hodgson@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6:	tbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	403 407 1794			PO number	VPO00816101			

SAMPLE DETAILS — ANALYSIS REQUESTED (Filtered - F, Field; L, Lab; FL, Field & Lab; N, None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIL.	F	N	F	N	F	N	N					
								PRESERV.	H2SO4	H2SO4	HCL	NONE	HNO3	HNO3	NONE					
								ANALYSIS	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	HG-T-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-METNIG-T-CL	TECKCOAL-ROUTINE-VA					
RG_FRUL_WS_LCO_LAEMP_2022-12_N	RG_FRUL	WS	NO	29-Nov-22	9:30	G	7		1	1	1	1	1	1	1					
RG_LIDSL_WS_LCO_LAEMP_2022-12_N	RG_LIDSL	WS	NO	29-Nov-22	13:30	G	7		1	1	1	1	1	1	1					
RG_FBLANK_WS_LCO_LAEMP_2022-12_NP	RG_FBLANK	WS	NO	29-Nov-22	12:30:00	G	7		1	1	1	1	1	1	1					
RG_TRIP_WS_LCO_LAEMP_2022-12_NP	RG_TRIP	WS	NO	29-Nov-22	12:00:00	G	4			1		1		1	1					
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														

Environmental Division
Calgary
Work Order Reference
CG2216667

Telephone : +1 403 407 1800

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Please preserve all metals samples when they arrive to the lab. Rush analysis of RG-LIDSL.	Rick Smit/Lotic Environmental	November 29, 2022	ND	NOV/30/22 09:55
				0°C

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS		Sampler's Signature	Rick Smit	Date/Time	November 29, 2022

WATER CHEMISTRY

ALS Laboratory Report CG2216689
(Finalized December 7, 2022)

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **CG2216689**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 01-Dec-2022 09:00
PO	: VPO00816101	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: REP_LAEMP_LCO_2022_DECEMBER_AL	Issue Date	: 07-Dec-2022 17:58
Sampler	: Rick Smit		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Metals, Calgary, Alberta
Sonthuong Bui	Laboratory Analyst	Metals, Calgary, Alberta
Zakieh Lalonde		Metals, Calgary, Alberta

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LI24_WS_LCO_LAEMP_2022-12_N	RG_SLINE_WS_LCO_LAEMP_2022-12_N	----	----	----
					Client sampling date / time	30-Nov-2022 09:40	30-Nov-2022 12:30	----	----	----
						CG2216689-001	CG2216689-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	<2.0	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		127	147	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		155	179	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	5.4	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		<1.0	3.2	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		127	152	----	----	----
conductivity	----	E100	2.0	µS/cm		374	377	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		208	214	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV		307	439	----	----	----
pH	----	E108	0.10	pH units		8.24	8.33	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		208	209	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		<1.0	<1.0	----	----	----
turbidity	----	E121	0.10	NTU		0.13	0.25	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		0.35	0.50	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.401	0.368	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		<0.500 DLM	<0.500 DLM	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.251	0.142	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0021	0.0024	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		85.3	71.4	----	----	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		<0.50	<0.50	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LI24_WS_LCO_LAEMP_2022-12_N	RG_SLINE_WS_LCO_LAEMP_2022-12_N	----	----	----
					Client sampling date / time	30-Nov-2022 09:40	30-Nov-2022 12:30	----	----	----
						CG2216689-001	CG2216689-002	--------	--------	--------
						Result	Result	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		<0.50	<0.50	----	----	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		4.36	4.57	----	----	----
cation sum	----	EC101	0.10	meq/L		4.23	4.33	----	----	----
ion balance (cations/anions)	----	EC101	0.010	%		97.0	94.7	----	----	----
ion balance (APHA)	----	EC101	0.01	%		-1.51	-2.70	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0033	0.0074	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00021	<0.00010	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0470	0.0435	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L		<0.020	<0.020	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	<0.010	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L		0.0088	0.0127	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		51.0	53.3	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00021	0.00050	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L		<0.10	<0.10	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.010	0.019	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0044	0.0040	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		14.9	17.2	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		<0.00010	0.00023	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00108	0.00146	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.311	0.408	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L		3.91	1.81	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LI24_WS_LCO_LAEMP_2022-12_N	RG_SLINE_WS_LCO_LAEMP_2022-12_N	----	----	----
					Client sampling date / time	30-Nov-2022 09:40	30-Nov-2022 12:30	----	----	----
						CG2216689-001	CG2216689-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
silicon, total	7440-21-3	E420	0.10	mg/L		1.96	2.38	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		1.42	0.935	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.199	0.173	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		31.8	24.9	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00184	0.00205	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	<0.0030	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0011	<0.0010	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00015	0.00011	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0468	0.0407	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	<0.020	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	<0.010	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.0084	0.0146	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		56.5	56.0	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		0.00018	0.00011	----	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L		<0.10	<0.10	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00020	<0.00020	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	<0.010	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0039	0.0033	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		16.2	18.1	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	RG_LI24_WS_LCO_LAEMP_2022-12_N	RG_SLINE_WS_LCO_LAEMP_2022-12_N	----	----	----
					Client sampling date / time	30-Nov-2022 09:40	30-Nov-2022 12:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit		CG2216689-001	CG2216689-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00111	0.00148	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.302	0.389	----	----	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L		4.07	1.92	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.75	2.12	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		1.54	0.962	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.208	0.176	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		29.8	25.0	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00185	0.00202	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0029	0.0027	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----

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

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2216689**	Page	: 1 of 16
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 01-Dec-2022 09:00
PO	: VPO00816101	Issue Date	: 07-Dec-2022 17:58
C-O-C number	: REP_LAEMP_LCO_2022_DECEMBER_AL		
Sampler	: Rick Smit		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_LI24_WS_LCO_LAEMP_2022-12_N	E298	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_SLINE_WS_LCO_LAEMP_2022-12_N	E298	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E235.Br-L	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E235.Br-L	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E235.Cl-L	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E235.Cl-L	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E378-U	30-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E378-U	30-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E235.F	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E235.F	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E235.NO3-L	30-Nov-2022	01-Dec-2022	3 days	1 days	✓	01-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E235.NO3-L	30-Nov-2022	01-Dec-2022	3 days	1 days	✓	01-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E235.NO2-L	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E235.NO2-L	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E235.SO4	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_SLINE_WS_LCO_LAEMP_2022-12_N	E235.SO4	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LI24_WS_LCO_LAEMP_2022-12_N	E318	30-Nov-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_SLINE_WS_LCO_LAEMP_2022-12_N	E318	30-Nov-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LI24_WS_LCO_LAEMP_2022-12_N	E372-U	30-Nov-2022	02-Dec-2022	----	----		07-Dec-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_SLINE_WS_LCO_LAEMP_2022-12_N	E372-U	30-Nov-2022	02-Dec-2022	----	----		07-Dec-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_LI24_WS_LCO_LAEMP_2022-12_N	E421.Cr-L	30-Nov-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_SLINE_WS_LCO_LAEMP_2022-12_N	E421.Cr-L	30-Nov-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
RG_LI24_WS_LCO_LAEMP_2022-12_N	E509	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
RG_SLINE_WS_LCO_LAEMP_2022-12_N	E509	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
RG_LI24_WS_LCO_LAEMP_2022-12_N	E421	30-Nov-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
RG_SLINE_WS_LCO_LAEMP_2022-12_N	E421	30-Nov-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	5 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_LI24_WS_LCO_LAEMP_2022-12_N	E358-L	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_SLINE_WS_LCO_LAEMP_2022-12_N	E358-L	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_LI24_WS_LCO_LAEMP_2022-12_N	E355-L	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_SLINE_WS_LCO_LAEMP_2022-12_N	E355-L	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_LI24_WS_LCO_LAEMP_2022-12_N	E283	30-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_SLINE_WS_LCO_LAEMP_2022-12_N	E283	30-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_LI24_WS_LCO_LAEMP_2022-12_N	E290	30-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	14 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E290	30-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E100	30-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E100	30-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	2 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E125	30-Nov-2022	----	----	----		03-Dec-2022	0.25 hrs	70 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E125	30-Nov-2022	----	----	----		03-Dec-2022	0.25 hrs	72 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E108	30-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E108	30-Nov-2022	02-Dec-2022	----	----		02-Dec-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E162	30-Nov-2022	----	----	----		03-Dec-2022	7 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E162	30-Nov-2022	----	----	----		03-Dec-2022	7 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E160-L	30-Nov-2022	----	----	----		06-Dec-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E160-L	30-Nov-2022	----	----	----		06-Dec-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LI24_WS_LCO_LAEMP_2022-12_N	E121	30-Nov-2022	----	----	----		02-Dec-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_SLINE_WS_LCO_LAEMP_2022-12_N	E121	30-Nov-2022	----	----	----		02-Dec-2022	3 days	2 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_LI24_WS_LCO_LAEMP_2022-12_N	E420.Cr-L	30-Nov-2022	04-Dec-2022	----	----		04-Dec-2022	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_SLINE_WS_LCO_LAEMP_2022-12_N	E420.Cr-L	30-Nov-2022	04-Dec-2022	----	----		04-Dec-2022	180 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LI24_WS_LCO_LAEMP_2022-12_N	E508	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_SLINE_WS_LCO_LAEMP_2022-12_N	E508	30-Nov-2022	01-Dec-2022	----	----		01-Dec-2022	28 days	1 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved) RG_LI24_WS_LCO_LAEMP_2022-12_N	E420	30-Nov-2022	04-Dec-2022	----	----		04-Dec-2022	180 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_SLINE_WS_LCO_LAEMP_2022-12_N	E420	30-Nov-2022	04-Dec-2022	----	----		04-Dec-2022	180 days	4 days	✓

Legend & Qualifier Definitions

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

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	765406	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	765606	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	764773	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	764810	1	9	11.1	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	764811	1	9	11.1	5.0	✓
Conductivity in Water	E100	765605	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767106	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	764816	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767107	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	764778	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	765529	1	7	14.2	5.0	✓
Fluoride in Water by IC	E235.F	764809	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	764812	1	9	11.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	764813	1	9	11.1	5.0	✓
ORP by Electrode	E125	764759	1	6	16.6	5.0	✓
pH by Meter	E108	765604	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	764814	1	9	11.1	5.0	✓
TDS by Gravimetry	E162	766414	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	766892	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	765498	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	764755	1	19	5.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	766893	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	764779	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	765467	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	765700	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	765406	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	765606	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	764773	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	764810	1	9	11.1	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	764811	1	9	11.1	5.0	✓
Conductivity in Water	E100	765605	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767106	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	764816	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767107	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	764778	1	19	5.2	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	765529	1	7	14.2	5.0	✓
Fluoride in Water by IC	E235.F	764809	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	764812	1	9	11.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	764813	1	9	11.1	5.0	✓
ORP by Electrode	E125	764759	1	6	16.6	5.0	✓
pH by Meter	E108	765604	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	764814	1	9	11.1	5.0	✓
TDS by Gravimetry	E162	766414	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	766892	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	765498	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	764755	1	19	5.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	766893	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	764779	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	765467	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	766409	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	765700	1	20	5.0	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	765406	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	765606	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	764773	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	764810	1	9	11.1	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	764811	1	9	11.1	5.0	✓
Conductivity in Water	E100	765605	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767106	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	764816	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767107	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	764778	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	765529	1	7	14.2	5.0	✓
Fluoride in Water by IC	E235.F	764809	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	764812	1	9	11.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	764813	1	9	11.1	5.0	✓
Sulfate in Water by IC	E235.SO4	764814	1	9	11.1	5.0	✓
TDS by Gravimetry	E162	766414	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	766892	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	765498	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	764755	1	19	5.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	766893	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	764779	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	765467	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
TSS by Gravimetry (Low Level)	E160-L	766409	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	765700	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	764773	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	764810	1	9	11.1	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	764811	1	9	11.1	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767106	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	764816	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767107	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	764778	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	765529	1	7	14.2	5.0	✓
Fluoride in Water by IC	E235.F	764809	1	9	11.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	764812	1	9	11.1	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	764813	1	9	11.1	5.0	✓
Sulfate in Water by IC	E235.SO4	764814	1	9	11.1	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	766892	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	765498	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	764755	1	19	5.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	766893	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	764779	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	765467	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Calgary - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **CG2216689**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	:	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 01-Dec-2022 09:00
PO	: VPO00816101	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: REP_LAEMP_LCO_2022_DECEMBER_AL	Issue Date	: 07-Dec-2022 17:58
Sampler	: Rick Smit ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Calgary Inorganics, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Ruifang Zheng	Analyst	Calgary Inorganics, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Sonthuong Bui	Laboratory Analyst	Calgary Metals, Calgary, Alberta
Zakieh Lalonde		Calgary Metals, Calgary, Alberta

General Comments

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

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts 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: 764759)											
CG2216683-005	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	243	237	2.33%	15%	----
Physical Tests (QC Lot: 765406)											
CG2216683-001	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 765604)											
CG2216684-001	Anonymous	pH	----	E108	0.10	pH units	8.09	8.10	0.124%	4%	----
Physical Tests (QC Lot: 765605)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	conductivity	----	E100	2.0	µS/cm	374	372	0.536%	10%	----
Physical Tests (QC Lot: 765606)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	127	124	2.71%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	127	124	2.71%	20%	----
Physical Tests (QC Lot: 765700)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	turbidity	----	E121	0.10	NTU	0.13	0.13	0.004	Diff <2x LOR	----
Physical Tests (QC Lot: 766414)											
CG2216688-001	Anonymous	solids, total dissolved [TDS]	----	E162	40	mg/L	2420	2520	4.17%	20%	----
Anions and Nutrients (QC Lot: 764773)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 764809)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	fluoride	16984-48-8	E235.F	0.020	mg/L	0.401	0.396	1.38%	20%	----
Anions and Nutrients (QC Lot: 764810)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 764811)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	0.35	0.34	0.004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 764812)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.251	0.252	0.159%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 764813)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 764814)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	85.3	84.8	0.593%	20%	----
Anions and Nutrients (QC Lot: 765467)											
CG2216679-004	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 765498)											
CG2216666-008	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.325	0.312	0.014	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 765529)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 764778)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 764779)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 764755)											
CG2216666-013	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 766892)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00021	0.00029	0.00007	Diff <2x LOR	----
Total Metals (QC Lot: 766893)											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0033	0.0061	0.0028	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00021	0.00013	0.00007	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0470	0.0477	1.53%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0088 µg/L	<0.0000050	0.0000038	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	51.0	53.1	4.00%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

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: 766893) - continued											
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	lithium, total	7439-93-2	E420	0.0010	mg/L	0.0044	0.0041	0.0003	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	14.9	15.6	4.47%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00108	0.00108	0.0389%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	0.00051	0.00001	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.311	0.307	0.004	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	3.91 µg/L	0.00379	2.99%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.96	1.96	0.0285%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	1.42	1.48	3.96%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.199	0.203	1.84%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	31.8	31.5	1.11%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00184	0.00189	2.44%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 764816)											
CG2216679-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 767106)											
CG2216672-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 767107)											
CG2216672-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0022	0.0024	0.0003	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00037	0.00034	0.00003	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	0.00013	0.00003	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0583	0.0616	5.42%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000406	0.0000412	0.0000006	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	78.2	80.7	3.17%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00018	0.00018	0.000004	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00101	0.00108	0.00007	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: 767107) - continued											
CG2216672-001	Anonymous	iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0085	0.0090	0.0005	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	28.4	29.0	2.33%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0550	0.0557	1.18%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00224	0.00229	2.39%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00092	0.00094	0.00002	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.774	0.793	2.36%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.0354	0.0379	6.75%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.59	1.63	2.54%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	3.10	3.16	1.99%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.149	0.150	1.26%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	57.2	58.4	2.11%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00048	0.00050	0.00002	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00105	0.00106	0.235%	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	0.0080	0.0081	0.0001	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: 765406)						
acidity (as CaCO3)	----	E283	2	mg/L	2.2	----
Physical Tests (QCLot: 765605)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 765606)						
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: 765700)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 766409)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 766414)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 764773)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 764809)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 764810)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 764811)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 764812)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 764813)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 764814)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 765467)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 765498)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 765529)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 764778)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 764779)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 764755)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 766892)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 766893)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 766893) - continued						
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
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	----
Dissolved Metals (QCLot: 764816)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 767106)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 767107)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 767107) - continued						
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
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	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 764759)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	100	95.4	104	----
Physical Tests (QCLot: 765406)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	107	85.0	115	----
Physical Tests (QCLot: 765604)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 765605)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.5	90.0	110	----
Physical Tests (QCLot: 765606)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	102	85.0	115	----
Physical Tests (QCLot: 765700)									
turbidity	----	E121	0.1	NTU	200 NTU	100	85.0	115	----
Physical Tests (QCLot: 766409)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	98.2	85.0	115	----
Physical Tests (QCLot: 766414)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	94.4	85.0	115	----
Anions and Nutrients (QCLot: 764773)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 764809)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 764810)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 764811)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 764812)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 764813)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 764814)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 765467)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 765498)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 765529)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	98.7	80.0	120	----
Organic / Inorganic Carbon (QCLot: 764778)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	97.7	80.0	120	----
Organic / Inorganic Carbon (QCLot: 764779)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	104	80.0	120	----
Total Metals (QCLot: 764755)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	99.2	80.0	120	----
Total Metals (QCLot: 766892)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Total Metals (QCLot: 766893)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	106	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	98.4	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	97.5	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	91.1	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.9	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	97.2	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	97.4	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	106	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	105	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	101	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.5	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	113	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.4	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.0	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	94.7	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	102	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.2	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 766893) - continued									
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	107	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	102	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	97.8	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	91.4	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	101	80.0	120	----
Dissolved Metals (QCLot: 767106)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Dissolved Metals (QCLot: 767107)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	104	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	97.3	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	95.8	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	90.6	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.1	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.5	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	98.2	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	96.6	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	110	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.2	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.8	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.9	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	99.9	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	95.1	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 767107) - continued									
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	94.0	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.4	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	98.2	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.1	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	89.6	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 764773)										
CG2216689-002	RG_SLINE_WS_LCO_LAEMP_2022-12_N	ammonia, total (as N)	7664-41-7	E298	0.105 mg/L	0.1 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 764809)										
CG2216689-002	RG_SLINE_WS_LCO_LAEMP_2022-12_N	fluoride	16984-48-8	E235.F	0.970 mg/L	1 mg/L	97.0	75.0	125	----
Anions and Nutrients (QCLot: 764810)										
CG2216689-002	RG_SLINE_WS_LCO_LAEMP_2022-12_N	bromide	24959-67-9	E235.Br-L	0.479 mg/L	0.5 mg/L	95.8	75.0	125	----
Anions and Nutrients (QCLot: 764811)										
CG2216689-002	RG_SLINE_WS_LCO_LAEMP_2022-12_N	chloride	16887-00-6	E235.Cl-L	96.3 mg/L	100 mg/L	96.3	75.0	125	----
Anions and Nutrients (QCLot: 764812)										
CG2216689-002	RG_SLINE_WS_LCO_LAEMP_2022-12_N	nitrate (as N)	14797-55-8	E235.NO3-L	2.42 mg/L	2.5 mg/L	96.7	75.0	125	----
Anions and Nutrients (QCLot: 764813)										
CG2216689-002	RG_SLINE_WS_LCO_LAEMP_2022-12_N	nitrite (as N)	14797-65-0	E235.NO2-L	0.488 mg/L	0.5 mg/L	97.7	75.0	125	----
Anions and Nutrients (QCLot: 764814)										
CG2216689-002	RG_SLINE_WS_LCO_LAEMP_2022-12_N	sulfate (as SO4)	14808-79-8	E235.SO4	94.5 mg/L	100 mg/L	94.5	75.0	125	----
Anions and Nutrients (QCLot: 765467)										
CG2216681-001	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 765498)										
CG2216666-009	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.68 mg/L	2.5 mg/L	107	70.0	130	----
Anions and Nutrients (QCLot: 765529)										
CG2216689-002	RG_SLINE_WS_LCO_LAEMP_2022-12_N	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0482 mg/L	0.05 mg/L	96.5	70.0	130	----
Organic / Inorganic Carbon (QCLot: 764778)										
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	carbon, dissolved organic [DOC]	----	E358-L	5.43 mg/L	5 mg/L	108	70.0	130	----
Organic / Inorganic Carbon (QCLot: 764779)										
CG2216689-001	RG_LI24_WS_LCO_LAEMP_2022-12_N	carbon, total organic [TOC]	----	E355-L	5.51 mg/L	5 mg/L	110	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 764755)										
CG2216677-001	Anonymous	mercury, total	7439-97-6	E508	0.000101 mg/L	0.0001 mg/L	101	70.0	130	----
Total Metals (QCLot: 766892)										
CG2216689-002	RG_SLINE_WS_LCO_LAEMP_2022-12_N	chromium, total	7440-47-3	E420.Cr-L	0.388 mg/L	0.4 mg/L	96.9	70.0	130	----
Total Metals (QCLot: 766893)										
CG2216689-002	RG_SLINE_WS_LCO_LAEMP_2022-12_N	aluminum, total	7429-90-5	E420	2.27 mg/L	2 mg/L	113	70.0	130	----
		antimony, total	7440-36-0	E420	0.199 mg/L	0.2 mg/L	99.6	70.0	130	----
		arsenic, total	7440-38-2	E420	0.190 mg/L	0.2 mg/L	95.0	70.0	130	----
		barium, total	7440-39-3	E420	0.198 mg/L	0.2 mg/L	98.8	70.0	130	----
		beryllium, total	7440-41-7	E420	0.394 mg/L	0.4 mg/L	98.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.108 mg/L	0.1 mg/L	108	70.0	130	----
		boron, total	7440-42-8	E420	0.904 mg/L	1 mg/L	90.4	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.186 mg/L	0.2 mg/L	92.8	70.0	130	----
		copper, total	7440-50-8	E420	0.199 mg/L	0.2 mg/L	99.7	70.0	130	----
		iron, total	7439-89-6	E420	20.0 mg/L	20 mg/L	100	70.0	130	----
		lead, total	7439-92-1	E420	0.199 mg/L	0.2 mg/L	99.6	70.0	130	----
		lithium, total	7439-93-2	E420	0.923 mg/L	1 mg/L	92.3	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.195 mg/L	0.2 mg/L	97.7	70.0	130	----
		nickel, total	7440-02-0	E420	0.373 mg/L	0.4 mg/L	93.2	70.0	130	----
		potassium, total	7440-09-7	E420	40.3 mg/L	40 mg/L	101	70.0	130	----
		selenium, total	7782-49-2	E420	0.399 mg/L	0.4 mg/L	99.7	70.0	130	----
		silicon, total	7440-21-3	E420	101 mg/L	100 mg/L	101	70.0	130	----
		silver, total	7440-22-4	E420	0.0436 mg/L	0.04 mg/L	109	70.0	130	----
		sodium, total	7440-23-5	E420	18.6 mg/L	20 mg/L	93.0	70.0	130	----
		strontium, total	7440-24-6	E420	0.196 mg/L	0.2 mg/L	98.0	70.0	130	----
		sulfur, total	7704-34-9	E420	188 mg/L	200 mg/L	94.0	70.0	130	----
		thallium, total	7440-28-0	E420	0.0410 mg/L	0.04 mg/L	102	70.0	130	----
		tin, total	7440-31-5	E420	0.197 mg/L	0.2 mg/L	98.7	70.0	130	----
		titanium, total	7440-32-6	E420	0.382 mg/L	0.4 mg/L	95.5	70.0	130	----
		uranium, total	7440-61-1	E420	0.0419 mg/L	0.04 mg/L	105	70.0	130	----
		vanadium, total	7440-62-2	E420	0.958 mg/L	1 mg/L	95.8	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
Total Metals (QCLot: 766893) - continued										
CG2216689-002	RG_SLINE_WS_LCO_LAE	zinc, total	7440-66-6	E420	3.53 mg/L	4 mg/L	88.4	70.0	130	----
Dissolved Metals (QCLot: 764816)										
CG2216679-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.000101 mg/L	0.0001 mg/L	101	70.0	130	----
Dissolved Metals (QCLot: 767106)										
CG2216672-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.385 mg/L	0.4 mg/L	96.2	70.0	130	----
Dissolved Metals (QCLot: 767107)										
CG2216672-002	Anonymous	aluminum, dissolved	7429-90-5	E421	1.98 mg/L	2 mg/L	99.0	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.192 mg/L	0.2 mg/L	96.0	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.177 mg/L	0.2 mg/L	88.5	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.385 mg/L	0.4 mg/L	96.3	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.830 mg/L	1 mg/L	83.0	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.194 mg/L	0.2 mg/L	96.9	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.188 mg/L	0.2 mg/L	94.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	19.3 mg/L	20 mg/L	96.4	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.195 mg/L	0.2 mg/L	97.7	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.916 mg/L	1 mg/L	91.6	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.184 mg/L	0.2 mg/L	92.2	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.386 mg/L	0.4 mg/L	96.5	70.0	130	----
		potassium, dissolved	7440-09-7	E421	39.2 mg/L	40 mg/L	98.0	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.405 mg/L	0.4 mg/L	101	70.0	130	----
		silicon, dissolved	7440-21-3	E421	94.0 mg/L	100 mg/L	94.0	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0405 mg/L	0.04 mg/L	101	70.0	130	----
		sodium, dissolved	7440-23-5	E421	20.2 mg/L	20 mg/L	101	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.209 mg/L	0.2 mg/L	104	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	178 mg/L	200 mg/L	89.0	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.192 mg/L	0.2 mg/L	96.2	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.375 mg/L	0.4 mg/L	93.7	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 767107) - continued										
CG2216672-002	Anonymous	uranium, dissolved	7440-61-1	E421	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.968 mg/L	1 mg/L	96.8	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.68 mg/L	4 mg/L	91.9	70.0	130	----

Teck

COC ID:	REP_LAEMP_LCO_2022_December_A LS	TURNAROUND TIME: Regular	RUSH: N/A

PROJECT/CLIENT INFO

Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	ALS Calgary		
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets		
Email	Cybele.Heddle@Teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com		
Address	421 Pine Ave			Address	2559 29 Street NE		
City	Sparwood	Province	BC	City	Calgary	Province	AB
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada
Phone Number	250-910-8755			Phone Number	403 407 1794		

Report Format / Distribution		Exc
Email 1:	aquascilab@teck.com	X
Email 2:	teckcoal@equisonline.com	
Email 3:	Teck.Lab.Results@teck.com	X
Email 4:	hannah.penner@teck.com	X
Email 5:	rhiannon.hodgson@minnow.ca	X
Email 6:	lbowron@minnow.ca	X
PO number	VPO0081610	

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ALS_Package-DOC (F, H2SO4)	ALS_Package-TKN/TOC (N, H2SO4)	HG-D-CVAF-VA (F, HCL)	HG-T-CVAF-VA (N, NONE)	TECKCOAL-MET-D-VA (F, HNO3)	TECKCOAL-METNHG-T-CL (N, HNO3)	TECKCOAL-ROUTINE-VA (N, NONE)
RG_LI24_WS_LCO_LAEMP_2022-12_N	RG_LI24	WS	NO	2022-11-30	09:40	G	7	X	X	X	X	X	X	X
RG_SLINE_WS_LCO_LAEMP_2022-12_N	RG_SLINE	WS	NO	2022-11-30	12:30	G	7	X	X	X	X	X	X	X
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								

Environmental Division
Calgary
Work Order Reference
CG2216689

Telephone : +1 403 407 1800

SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Rick Smit / Lotic environmental	2022-11-30/1600	NC	01/DEC/22 0900
			3°C	

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature	Rick Smit	Date/Time	2022-11-30 1600
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Environmental Division
Calgary
Work Order Reference
CG2216689

WATER CHEMISTRY

ALS Laboratory Report CG2216739
(Finalized December 8, 2022)

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **CG2216739**	Page	: 1 of 7
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 02-Dec-2022 08:50
PO	: VPO00816101	Date Analysis Commenced	: 02-Dec-2022
C-O-C number	: REP_LAEMP_LCO_2022_December_AL	Issue Date	: 08-Dec-2022 17:12
Sampler	: Rick Smit		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Anthony Calero	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Kevin Baxter	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Maria Tuguinay	Lab Assistant	Inorganics, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Metals, Calgary, Alberta

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Sample Comments

Sample	Client Id	*Comment*
CG2216739-001	RG_LILC3_WS_LAEMP_LCO_2022-12_N	Sample(s) 1-5: Sample Received Unpreserved. Results may be biased either high or low for indicated parameter(s).
CG2216739-002	RG_LCUT_WS_LAEMP_LCO_2022-12_N	Sample(s) 1-5: Sample Received Unpreserved. Results may be biased either high or low for indicated parameter(s).
CG2216739-003	RG_LISP24_WS_LAEMP_LCO_2022-12_N	Sample(s) 1-5: Sample Received Unpreserved. Results may be biased either high or low for indicated parameter(s).
CG2216739-004	RG_RIVER_WS_LAEMP_LCO_2022-12_N	Sample(s) 1-5: Sample Received Unpreserved. Results may be biased either high or low for indicated parameter(s).

CG2216739-005	RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	Sample(s) 1-5: Sample Received Unpreserved. Results may be biased either high or low for indicated parameter(s).

Qualifiers

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DTSE	Dissolved Se concentration exceeds total. Positive bias on D-Se suspected due to signal enhancement from volatile selenium species. Contact ALS if an alternative test to address this interference is needed.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LILC3_WS_LAEMP_LCO_2022-12_N	RG_LCUT_WS_LAEMP_LCO_2022-12_N	RG_LISP24_WS_LAEMP_LCO_2022-12_N	RG_RIVER_WS_LAEMP_LCO_2022-12_N	RG_LIDCOM_WS_LAEMP_LCO_2022-12_N
					Client sampling date / time	01-Dec-2022 09:45	01-Dec-2022 11:20	01-Dec-2022 13:30	01-Dec-2022 13:00	01-Dec-2022 15:00
						CG2216739-001	CG2216739-002	CG2216739-003	CG2216739-004	CG2216739-005
						Result	Result	Result	Result	Result
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	<2.0	<2.0	<2.0	<2.0
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		207	212	189	184	180
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		253	258	231	225	219
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		8.6	8.8	13.4	14.2	16.8
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		5.2	5.3	8.0	8.5	10.1
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		216	221	203	199	196
conductivity	----	E100	2.0	µS/cm		1050	978	930	927	837
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		624	542	508	531	477
oxidation-reduction potential [ORP]	----	E125	0.10	mV		430	426	413	416	410
pH	----	E108	0.10	pH units		8.33	8.33	8.41	8.41	8.44
solids, total dissolved [TDS]	----	E162	10	mg/L		769	706	678	672	597
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
turbidity	----	E121	0.10	NTU		0.17	0.23	0.18	0.17	<0.10
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	<0.250 DLDS	<0.050	<0.250 DLDS	<0.050
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		19.1	8.79	15.2	15.4	12.5
fluoride	16984-48-8	E235.F	0.020	mg/L		0.200	0.203	0.198	0.201	0.195
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		1.08	1.25 TKNI	1.48	0.863 TKNI	0.801
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		10.6	13.3	8.50	8.70	7.16
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	0.0021	<0.0050 DLDS	0.0018
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0025	0.0034	0.0022	0.0022	0.0032
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0027	0.0035 DLM	0.0031	0.0021	0.0040
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		367	316	296	305	255
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_LILC3_WS_LAEMP_LCO_2022-12_N	RG_LCUT_WS_LAEMP_LCO_2022-12_N	RG_LISP24_WS_LAEMP_LCO_2022-12_N	RG_RIVER_WS_LAEMP_LCO_2022-12_N	RG_LIDCOM_WS_LAEMP_LCO_2022-12_N
Client sampling date / time					01-Dec-2022 09:45	01-Dec-2022 11:20	01-Dec-2022 13:30	01-Dec-2022 13:00	01-Dec-2022 15:00
					CG2216739-001	CG2216739-002	CG2216739-003	CG2216739-004	CG2216739-005
					Result	Result	Result	Result	Result
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50
Ion Balance									
anion sum	----	EC101	0.10	meq/L	13.3	12.2	11.3	11.4	10.1
cation sum	----	EC101	0.10	meq/L	13.0	11.3	10.6	11.0	9.90
ion balance (cations/anions)	----	EC101	0.010	%	97.7	92.6	93.8	96.5	98.0
ion balance (APHA)	----	EC101	0.01	%	-1.14	-3.83	-3.20	-1.78	-1.00
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0.0042	0.0030	0.0032
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00030	0.00037	0.00026	0.00026	0.00020
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00010	0.00010	0.00013	0.00012	0.00010
barium, total	7440-39-3	E420	0.00010	mg/L	0.0577	0.0563	0.0569	0.0552	0.0676
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	<0.020	<0.020	<0.020	<0.020
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	0.017	0.018	0.015	0.015	0.014
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.194	0.320	0.171	0.160	0.118
calcium, total	7440-70-2	E420	0.050	mg/L	138	128	121	120	108
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00011	0.00012	0.00015	0.00012	0.00014
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
iron, total	7439-89-6	E420	0.010	mg/L	0.024	<0.010	0.016	0.017	<0.010
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0595	0.0649	0.0504	0.0499	0.0411
magnesium, total	7439-95-4	E420	0.0050	mg/L	72.6	61.6	62.2	61.7	53.0
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0141	0.00014	0.00875	0.00933	0.00240
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00358	0.00185	0.00302	0.00311	0.00247
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00854	0.0100	0.00642	0.00647	0.00372
potassium, total	7440-09-7	E420	0.050	mg/L	2.04	1.98	1.72	1.70	1.38
selenium, total	7782-49-2	E420	0.050	µg/L	49.2 DTSE	64.6	41.5	42.6	40.4

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LILC3_WS_LAEMP_LCO_2022-12_N	RG_LCUT_WS_LAEMP_LCO_2022-12_N	RG_LISP24_WS_LAEMP_LCO_2022-12_N	RG_RIVER_WS_LAEMP_LCO_2022-12_N	RG_LIDCOM_WS_LAEMP_LCO_2022-12_N
					Client sampling date / time	01-Dec-2022 09:45	01-Dec-2022 11:20	01-Dec-2022 13:30	01-Dec-2022 13:00	01-Dec-2022 15:00
						CG2216739-001	CG2216739-002	CG2216739-003	CG2216739-004	CG2216739-005
						Result	Result	Result	Result	Result
Total Metals										
silicon, total	7440-21-3	E420	0.10	mg/L		2.28	2.36	2.32	2.24	2.35
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L		11.5	9.95	9.41	9.47	7.89
strontium, total	7440-24-6	E420	0.00020	mg/L		0.229	0.230	0.212	0.222	0.206
sulfur, total	7704-34-9	E420	0.50	mg/L		142	127	118	116	104
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	0.000016	<0.000010	<0.000010	<0.000010
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00483	0.00459	0.00433	0.00426	0.00365
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0076	0.0106	0.0053	0.0060	0.0036
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	0.0011
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00031	0.00039	0.00025	0.00025	0.00020
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00010	0.00011	0.00013	<0.00010	<0.00010
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0583	0.0538	0.0528	0.0574	0.0680
beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	<0.020
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.017	0.018	0.015	0.015	0.014
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.217	0.320	0.168	0.159	0.117
calcium, dissolved	7440-70-2	E421	0.050	mg/L		135	122	112	115	108
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		<0.00010	<0.00010	<0.00010	0.00016	0.00012
cobalt, dissolved	7440-48-4	E421	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00026	0.00031	0.00021	0.00020	<0.00020
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0612	0.0638	0.0482	0.0498	0.0415
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		69.7	57.6	55.5	59.2	50.3
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.0138	0.00011	0.00627	0.00680	0.00149

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_LILC3_WS_LAEMP_LCO_2022-12_N	RG_LCUT_WS_LAEMP_LCO_2022-12_N	RG_LISP24_WS_LAEMP_LCO_2022-12_N	RG_RIVER_WS_LAEMP_LCO_2022-12_N	RG_LIDCOM_WS_LAEMP_LCO_2022-12_N
					Client sampling date / time	01-Dec-2022 09:45	01-Dec-2022 11:20	01-Dec-2022 13:30	01-Dec-2022 13:00	01-Dec-2022 15:00
						CG2216739-001	CG2216739-002	CG2216739-003	CG2216739-004	CG2216739-005
						Result	Result	Result	Result	Result
Dissolved Metals										
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00357	0.00180	0.00305	0.00308	0.00248
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00808	0.00907	0.00566	0.00604	0.00354
potassium, dissolved	7440-09-7	E421	0.050	mg/L		2.04	1.87	1.54	1.69	1.40
selenium, dissolved	7782-49-2	E421	0.050	µg/L		68.3 DTSE	72.8	49.2	49.0	53.2
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.36	2.17	2.26	2.31	2.38
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L		11.4	9.23	8.56	9.27	7.83
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.230	0.230	0.208	0.216	0.214
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		150	128	134	127	105
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		0.000011	0.000015	<0.000010	<0.000010	<0.000010
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00483	0.00429	0.00413	0.00419	0.00358
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0081	0.0106	0.0052	0.0055	0.0036
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2216739**	Page	: 1 of 24
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 02-Dec-2022 08:50
PO	: VPO00816101	Issue Date	: 08-Dec-2022 17:12
C-O-C number	: REP_LAEMP_LCO_2022_December_AL		
Sampler	: Rick Smit		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_LCUT_WS_LAEMP_LCO_2022-12_N	E298	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E298	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_LILC3_WS_LAEMP_LCO_2022-12_N	E298	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_LISP24_WS_LAEMP_LCO_2022-12_N	E298	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_RIVER_WS_LAEMP_LCO_2022-12_N	E298	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E235.Br-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E235.Br-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E235.Br-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E235.Br-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E235.Br-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E235.Cl-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E235.Cl-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E235.Cl-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E235.Cl-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E235.Cl-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E378-U	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E378-U	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E378-U	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E378-U	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E378-U	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E235.F	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E235.F	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E235.F	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E235.F	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E235.F	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E235.NO3-L	01-Dec-2022	02-Dec-2022	3 days	1 days	✓	02-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E235.NO3-L	01-Dec-2022	02-Dec-2022	3 days	1 days	✓	02-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E235.NO3-L	01-Dec-2022	02-Dec-2022	3 days	1 days	✓	02-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E235.NO3-L	01-Dec-2022	02-Dec-2022	3 days	1 days	✓	02-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E235.NO3-L	01-Dec-2022	02-Dec-2022	3 days	1 days	✓	02-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E235.NO2-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E235.NO2-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E235.NO2-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	3 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-12_N	E235.NO2-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-12_N	E235.NO2-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LCUT_WS_LAEMP_LCO_2022-12_N	E235.SO4	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E235.SO4	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LILC3_WS_LAEMP_LCO_2022-12_N	E235.SO4	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LISP24_WS_LAEMP_LCO_2022-12_N	E235.SO4	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_RIVER_WS_LAEMP_LCO_2022-12_N	E235.SO4	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LCUT_WS_LAEMP_LCO_2022-12_N	E318	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E318	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_LILC3_WS_LAEMP_LCO_2022-12_N	E318	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_LISP24_WS_LAEMP_LCO_2022-12_N	E318	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_RIVER_WS_LAEMP_LCO_2022-12_N	E318	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) RG_LCUT_WS_LAEMP_LCO_2022-12_N	E372-U	01-Dec-2022	08-Dec-2022	----	----		08-Dec-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E372-U	01-Dec-2022	08-Dec-2022	----	----		08-Dec-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) RG_LILC3_WS_LAEMP_LCO_2022-12_N	E372-U	01-Dec-2022	08-Dec-2022	----	----		08-Dec-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) RG_LISP24_WS_LAEMP_LCO_2022-12_N	E372-U	01-Dec-2022	08-Dec-2022	----	----		08-Dec-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) RG_RIVER_WS_LAEMP_LCO_2022-12_N	E372-U	01-Dec-2022	08-Dec-2022	----	----		08-Dec-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) RG_LCUT_WS_LAEMP_LCO_2022-12_N	E421.Cr-L	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E421.Cr-L	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) RG_LILC3_WS_LAEMP_LCO_2022-12_N	E421.Cr-L	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) RG_LISP24_WS_LAEMP_LCO_2022-12_N	E421.Cr-L	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) RG_RIVER_WS_LAEMP_LCO_2022-12_N	E421.Cr-L	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LCUT_WS_LAEMP_LCO_2022-12_N	E509	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E509	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LILC3_WS_LAEMP_LCO_2022-12_N	E509	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_LISP24_WS_LAEMP_LCO_2022-12_N	E509	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_RIVER_WS_LAEMP_LCO_2022-12_N	E509	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_LCUT_WS_LAEMP_LCO_2022-12_N	E421	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E421	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_LILC3_WS_LAEMP_LCO_2022-12_N	E421	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_LISP24_WS_LAEMP_LCO_2022-12_N	E421	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) RG_RIVER_WS_LAEMP_LCO_2022-12_N	E421	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LCUT_WS_LAEMP_LCO_2022-12_N	E358-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E358-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LILC3_WS_LAEMP_LCO_2022-12_N	E358-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_LISP24_WS_LAEMP_LCO_2022-12_N	E358-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_RIVER_WS_LAEMP_LCO_2022-12_N	E358-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LCUT_WS_LAEMP_LCO_2022-12_N	E355-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E355-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LILC3_WS_LAEMP_LCO_2022-12_N	E355-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_LISP24_WS_LAEMP_LCO_2022-12_N	E355-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_RIVER_WS_LAEMP_LCO_2022-12_N	E355-L	01-Dec-2022	02-Dec-2022	----	----		02-Dec-2022	28 days	1 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E283	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E283	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E283	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	14 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Acidity by Titration										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E283	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E283	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E290	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E290	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E290	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E290	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E290	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E100	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E100	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E100	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E100	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E100	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	2 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E125	01-Dec-2022	----	----	----		05-Dec-2022	0.25 hrs	92 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E125	01-Dec-2022	----	----	----		05-Dec-2022	0.25 hrs	93 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E125	01-Dec-2022	----	----	----		05-Dec-2022	0.25 hrs	94 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E125	01-Dec-2022	----	----	----		05-Dec-2022	0.25 hrs	95 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E125	01-Dec-2022	----	----	----		05-Dec-2022	0.25 hrs	97 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E108	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	0.25 hrs	0.26 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E108	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E108	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E108	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E108	01-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E162	01-Dec-2022	----	----	----		05-Dec-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E162	01-Dec-2022	----	----	----		05-Dec-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E162	01-Dec-2022	----	----	----		05-Dec-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E162	01-Dec-2022	----	----	----		05-Dec-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E162	01-Dec-2022	----	----	----		05-Dec-2022	7 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E160-L	01-Dec-2022	----	----	----		06-Dec-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E160-L	01-Dec-2022	----	----	----		06-Dec-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E160-L	01-Dec-2022	----	----	----		06-Dec-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E160-L	01-Dec-2022	----	----	----		07-Dec-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E160-L	01-Dec-2022	----	----	----		07-Dec-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LCUT_WS_LAEMP_LCO_2022-12_N	E121	01-Dec-2022	----	----	----		03-Dec-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E121	01-Dec-2022	----	----	----		03-Dec-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LILC3_WS_LAEMP_LCO_2022-12_N	E121	01-Dec-2022	----	----	----		03-Dec-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LISP24_WS_LAEMP_LCO_2022-12_N	E121	01-Dec-2022	----	----	----		03-Dec-2022	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE RG_RIVER_WS_LAEMP_LCO_2022-12_N	E121	01-Dec-2022	----	----	----		03-Dec-2022	3 days	2 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_LCUT_WS_LAEMP_LCO_2022-12_N	E420.Cr-L	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E420.Cr-L	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_LILC3_WS_LAEMP_LCO_2022-12_N	E420.Cr-L	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_LISP24_WS_LAEMP_LCO_2022-12_N	E420.Cr-L	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_RIVER_WS_LAEMP_LCO_2022-12_N	E420.Cr-L	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LCUT_WS_LAEMP_LCO_2022-12_N	E508	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E508	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LILC3_WS_LAEMP_LCO_2022-12_N	E508	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LISP24_WS_LAEMP_LCO_2022-12_N	E508	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_RIVER_WS_LAEMP_LCO_2022-12_N	E508	01-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	3 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved) RG_LCUT_WS_LAEMP_LCO_2022-12_N	E420	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved) RG_LIDCOM_WS_LAEMP_LCO_2022-12_N	E420	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved) RG_LILC3_WS_LAEMP_LCO_2022-12_N	E420	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved) RG_LISP24_WS_LAEMP_LCO_2022-12_N	E420	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved) RG_RIVER_WS_LAEMP_LCO_2022-12_N	E420	01-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	4 days	✓

Legend & Qualifier Definitions

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

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	766661	1	18	5.5	5.0	✓
Alkalinity Species by Titration	E290	766664	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	766148	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	766118	1	19	5.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	766119	1	19	5.2	5.0	✓
Conductivity in Water	E100	766663	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767686	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	766822	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767685	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	766112	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	766382	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	766117	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	766120	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	766121	1	19	5.2	5.0	✓
ORP by Electrode	E125	766946	1	20	5.0	5.0	✓
pH by Meter	E108	766662	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	766122	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	767360	2	40	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	767051	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	766522	1	14	7.1	5.0	✓
Total Mercury in Water by CVAAS	E508	766824	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	767050	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	766113	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	767870	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	766367	2	29	6.9	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	766661	1	18	5.5	5.0	✓
Alkalinity Species by Titration	E290	766664	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	766148	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	766118	1	19	5.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	766119	1	19	5.2	5.0	✓
Conductivity in Water	E100	766663	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767686	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	766822	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767685	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	766112	1	7	14.2	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	766382	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	766117	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	766120	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	766121	1	19	5.2	5.0	✓
ORP by Electrode	E125	766946	1	20	5.0	5.0	✓
pH by Meter	E108	766662	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	766122	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	767360	2	40	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	767051	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	766522	1	14	7.1	5.0	✓
Total Mercury in Water by CVAAS	E508	766824	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	767050	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	766113	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	767870	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	767355	2	40	5.0	5.0	✓
Turbidity by Nephelometry	E121	766367	2	29	6.9	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	766661	1	18	5.5	5.0	✓
Alkalinity Species by Titration	E290	766664	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	766148	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	766118	1	19	5.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	766119	1	19	5.2	5.0	✓
Conductivity in Water	E100	766663	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767686	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	766822	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767685	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	766112	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	766382	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	766117	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	766120	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	766121	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	766122	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	767360	2	40	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	767051	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	766522	1	14	7.1	5.0	✓
Total Mercury in Water by CVAAS	E508	766824	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	767050	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	766113	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	767870	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
TSS by Gravimetry (Low Level)	E160-L	767355	2	40	5.0	5.0	✓
Turbidity by Nephelometry	E121	766367	2	29	6.9	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	766148	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	766118	1	19	5.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	766119	1	19	5.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767686	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	766822	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767685	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	766112	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	766382	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	766117	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	766120	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	766121	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	766122	1	19	5.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	767051	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	766522	1	14	7.1	5.0	✓
Total Mercury in Water by CVAAS	E508	766824	1	20	5.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	767050	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	766113	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	767870	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Calgary - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **CG2216739**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	:	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 02-Dec-2022 08:50
PO	: VPO00816101	Date Analysis Commenced	: 02-Dec-2022
C-O-C number	: REP_LAEMP_LCO_2022_December_AL	Issue Date	: 08-Dec-2022 17:12
Sampler	: Rick Smit ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Calgary Inorganics, Calgary, Alberta
Anthony Calero	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Kevin Baxter	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Maria Tuguinay	Lab Assistant	Calgary Inorganics, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Calgary Metals, Calgary, Alberta

General Comments

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

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts 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: 766367)											
CG2216726-001	Anonymous	turbidity	----	E121	0.10	NTU	1.76	1.80	2.25%	15%	----
Physical Tests (QC Lot: 766370)											
CG2216735-004	Anonymous	turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 766661)											
CG2216734-001	Anonymous	acidity (as CaCO3)	----	E283	10.0	mg/L	<10.0	<10.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 766662)											
CG2216734-001	Anonymous	pH	----	E108	0.10	pH units	8.13	8.15	0.246%	4%	----
Physical Tests (QC Lot: 766663)											
CG2216734-001	Anonymous	conductivity	----	E100	2.0	µS/cm	1800	1800	0.278%	10%	----
Physical Tests (QC Lot: 766664)											
CG2216734-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	428	436	1.78%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	428	436	1.78%	20%	----
Physical Tests (QC Lot: 766946)											
CG2216735-004	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	545	547	0.220%	15%	----
Physical Tests (QC Lot: 767360)											
CG2216734-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1520	1540	1.01%	20%	----
Physical Tests (QC Lot: 767361)											
CG2216739-004	RG_RIVER_WS_LAEMP_LCO_2022-12_N	solids, total dissolved [TDS]	----	E162	20	mg/L	672	673	0.223%	20%	----
Anions and Nutrients (QC Lot: 766117)											
CG2216726-001	Anonymous	fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 766118)											
CG2216726-001	Anonymous	bromide	24959-67-9	E235.Br-L	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 766119)											
CG2216726-001	Anonymous	chloride	16887-00-6	E235.Cl-L	2.00	mg/L	11.5	11.7	0.15	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 766120)											
CG2216726-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	188	189	0.403%	20%	----
Anions and Nutrients (QC Lot: 766121)											

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: 766121) - continued											
CG2216726-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	0.779	0.779	0.0128%	20%	----
Anions and Nutrients (QC Lot: 766122)											
CG2216726-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	1400	1410	0.329%	20%	----
Anions and Nutrients (QC Lot: 766148)											
CG2216732-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0079	0.0068	0.0011	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 766382)											
CG2216734-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0019	0.0017	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 766522)											
CG2216735-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 767870)											
CG2216735-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0055	0.0044	0.0011	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 766112)											
CG2216739-001	RG_LILC3_WS_LAEMP_LCO_2022-12_N	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 766113)											
CG2216739-001	RG_LILC3_WS_LAEMP_LCO_2022-12_N	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 766824)											
CG2216729-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 767050)											
CG2216729-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0176	0.0146	0.0030	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00033	0.00038	0.00005	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0557	0.0551	0.957%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0160 µg/L	0.0000078	0.0000082	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	44.6	43.7	1.91%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.018	0.018	0.0002	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0032	0.0032	0.00003	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	14.1	14.2	0.810%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 767050) - continued											
CG2216729-001	Anonymous	manganese, total	7439-96-5	E420	0.00010	mg/L	0.00250	0.00250	0.171%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000765	0.000738	3.51%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.654	0.658	0.607%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	1.92 µg/L	0.00191	0.482%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.09	2.01	4.15%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	4.84	4.97	2.61%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.169	0.165	1.93%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	15.0	14.9	0.787%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000013	<0.000010	0.000003	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	0.00011	0.000007	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	0.00030	0.0000006	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000861	0.000870	1.10%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Total Metals (QC Lot: 767051)											
CG2216729-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00012	0.00016	0.00004	Diff <2x LOR	----
Dissolved Metals (QC Lot: 766822)											
CG2216729-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 767685)											
CG2216732-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0018	0.0019	0.00009	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00047	0.00042	0.00004	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0465	0.0467	0.447%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.015	0.016	0.001	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0050 µg/L	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	41.9	42.0	0.294%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

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: 767685) - continued											
CG2216732-001	Anonymous	lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0021	0.0021	0.000006	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	14.7	14.5	1.39%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00273	0.00263	3.63%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000695	0.000707	1.77%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.756	0.758	0.268%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.584 µg/L	0.000529	9.96%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.68	2.60	2.92%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	7.36	7.23	1.70%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.183	0.184	0.740%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	17.5	17.6	0.133%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	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	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000854	0.000843	1.29%	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	0.0014	0.0011	0.0003	Diff <2x LOR	----
Dissolved Metals (QC Lot: 767686)											
CG2216732-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	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: 766367)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 766370)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 766661)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 766663)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 766664)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	1.4	----
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	1.4	----
Physical Tests (QCLot: 767355)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 767356)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 767360)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 767361)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 766117)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 766118)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 766119)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 766120)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 766121)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 766122)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 766148)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 766382)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 766522)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 767870)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 766112)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 766113)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 766824)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 767050)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 767050) - continued						
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
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	----
Total Metals (QCLot: 767051)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 766822)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 767685)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 767685) - continued						
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
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	----
Dissolved Metals (QCLot: 767686)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 766367)									
turbidity	----	E121	0.1	NTU	200 NTU	103	85.0	115	----
Physical Tests (QCLot: 766370)									
turbidity	----	E121	0.1	NTU	200 NTU	105	85.0	115	----
Physical Tests (QCLot: 766661)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	104	85.0	115	----
Physical Tests (QCLot: 766662)									
pH	----	E108	----	pH units	7 pH units	101	98.6	101	----
Physical Tests (QCLot: 766663)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.7	90.0	110	----
Physical Tests (QCLot: 766664)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 766946)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	99.5	95.4	104	----
Physical Tests (QCLot: 767355)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	102	85.0	115	----
Physical Tests (QCLot: 767356)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	97.2	85.0	115	----
Physical Tests (QCLot: 767360)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	97.4	85.0	115	----
Physical Tests (QCLot: 767361)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	97.2	85.0	115	----
Anions and Nutrients (QCLot: 766117)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 766118)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 766119)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	99.9	90.0	110	----
Anions and Nutrients (QCLot: 766120)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 766121)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.9	90.0	110	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 766122)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 766148)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 766382)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	99.1	80.0	120	----
Anions and Nutrients (QCLot: 766522)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	114	75.0	125	----
Anions and Nutrients (QCLot: 767870)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	100	80.0	120	----
Organic / Inorganic Carbon (QCLot: 766112)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	94.3	80.0	120	----
Organic / Inorganic Carbon (QCLot: 766113)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	94.8	80.0	120	----
Total Metals (QCLot: 766824)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	111	80.0	120	----
Total Metals (QCLot: 767050)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	112	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	103	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	92.1	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	107	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	103	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	96.4	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 767050) - continued									
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	92.1	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	106	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	94.8	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	103	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	109	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	100	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	100	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	106	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	107	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	100	80.0	120	----
Total Metals (QCLot: 767051)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	94.5	80.0	120	----
Dissolved Metals (QCLot: 767685)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	117	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	100.0	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	97.7	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	93.1	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.8	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	105	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	108	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.3	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 767685) - continued									
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	107	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	89.8	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	94.5	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	107	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	104	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.4	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	104	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	104	80.0	120	----
Dissolved Metals (QCLot: 767686)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	105	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 766117)										
CG2216726-004	Anonymous	fluoride	16984-48-8	E235.F	0.961 mg/L	1 mg/L	96.1	75.0	125	----
Anions and Nutrients (QCLot: 766118)										
CG2216726-004	Anonymous	bromide	24959-67-9	E235.Br-L	0.472 mg/L	0.5 mg/L	94.4	75.0	125	----
Anions and Nutrients (QCLot: 766119)										
CG2216726-004	Anonymous	chloride	16887-00-6	E235.Cl-L	93.7 mg/L	100 mg/L	93.7	75.0	125	----
Anions and Nutrients (QCLot: 766120)										
CG2216726-004	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.36 mg/L	2.5 mg/L	94.2	75.0	125	----
Anions and Nutrients (QCLot: 766121)										
CG2216726-004	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.476 mg/L	0.5 mg/L	95.2	75.0	125	----
Anions and Nutrients (QCLot: 766122)										
CG2216726-004	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	95.1 mg/L	100 mg/L	95.1	75.0	125	----
Anions and Nutrients (QCLot: 766148)										
CG2216732-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.105 mg/L	0.1 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 766382)										
CG2216734-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0516 mg/L	0.05 mg/L	103	70.0	130	----
Anions and Nutrients (QCLot: 766522)										
CG2216735-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.55 mg/L	2.5 mg/L	102	70.0	130	----
Anions and Nutrients (QCLot: 767870)										
CG2216735-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0471 mg/L	0.05 mg/L	94.2	70.0	130	----
Organic / Inorganic Carbon (QCLot: 766112)										
CG2216739-001	RG_LILC3_WS_LAEMP_LCO_2022-12_N	carbon, dissolved organic [DOC]	----	E358-L	5.19 mg/L	5 mg/L	104	70.0	130	----
Organic / Inorganic Carbon (QCLot: 766113)										
CG2216739-001	RG_LILC3_WS_LAEMP_LCO_2022-12_N	carbon, total organic [TOC]	----	E355-L	5.63 mg/L	5 mg/L	112	70.0	130	----
Total Metals (QCLot: 766824)										
CG2216729-002	Anonymous	mercury, total	7439-97-6	E508	0.000110 mg/L	0.0001 mg/L	110	70.0	130	----
Total Metals (QCLot: 767050)										
CG2216729-002	Anonymous									

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: 767050) - continued										
CG2216729-002	Anonymous	aluminum, total	7429-90-5	E420	2.08 mg/L	2 mg/L	104	70.0	130	----
		antimony, total	7440-36-0	E420	0.193 mg/L	0.2 mg/L	96.5	70.0	130	----
		arsenic, total	7440-38-2	E420	0.194 mg/L	0.2 mg/L	96.8	70.0	130	----
		barium, total	7440-39-3	E420	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		beryllium, total	7440-41-7	E420	0.382 mg/L	0.4 mg/L	95.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0999 mg/L	0.1 mg/L	99.9	70.0	130	----
		boron, total	7440-42-8	E420	0.864 mg/L	1 mg/L	86.4	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		copper, total	7440-50-8	E420	0.200 mg/L	0.2 mg/L	99.9	70.0	130	----
		iron, total	7439-89-6	E420	20.3 mg/L	20 mg/L	102	70.0	130	----
		lead, total	7439-92-1	E420	0.197 mg/L	0.2 mg/L	98.4	70.0	130	----
		lithium, total	7439-93-2	E420	0.935 mg/L	1 mg/L	93.5	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.192 mg/L	0.2 mg/L	96.0	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.184 mg/L	0.2 mg/L	92.2	70.0	130	----
		nickel, total	7440-02-0	E420	0.388 mg/L	0.4 mg/L	96.9	70.0	130	----
		potassium, total	7440-09-7	E420	39.8 mg/L	40 mg/L	99.6	70.0	130	----
		selenium, total	7782-49-2	E420	0.389 mg/L	0.4 mg/L	97.2	70.0	130	----
		silicon, total	7440-21-3	E420	97.8 mg/L	100 mg/L	97.8	70.0	130	----
		silver, total	7440-22-4	E420	0.0410 mg/L	0.04 mg/L	102	70.0	130	----
		sodium, total	7440-23-5	E420	19.5 mg/L	20 mg/L	97.3	70.0	130	----
		strontium, total	7440-24-6	E420	0.183 mg/L	0.2 mg/L	91.7	70.0	130	----
		sulfur, total	7704-34-9	E420	198 mg/L	200 mg/L	99.3	70.0	130	----
		thallium, total	7440-28-0	E420	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----
		tin, total	7440-31-5	E420	0.190 mg/L	0.2 mg/L	95.0	70.0	130	----
		titanium, total	7440-32-6	E420	0.387 mg/L	0.4 mg/L	96.8	70.0	130	----
		uranium, total	7440-61-1	E420	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		vanadium, total	7440-62-2	E420	1.00 mg/L	1 mg/L	100	70.0	130	----
		zinc, total	7440-66-6	E420	3.89 mg/L	4 mg/L	97.3	70.0	130	----
Total Metals (QCLot: 767051)										
CG2216729-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.401 mg/L	0.4 mg/L	100	70.0	130	----
Dissolved Metals (QCLot: 766822)										
CG2216729-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.000106 mg/L	0.0001 mg/L	106	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 767685)										
CG2216732-002	Anonymous	aluminum, dissolved	7429-90-5	E421	2.01 mg/L	2 mg/L	100	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.198 mg/L	0.2 mg/L	99.2	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.193 mg/L	0.2 mg/L	96.6	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.385 mg/L	0.4 mg/L	96.2	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0991 mg/L	0.1 mg/L	99.1	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.930 mg/L	1 mg/L	93.0	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0388 mg/L	0.04 mg/L	97.1	70.0	130	----
		calcium, dissolved	7440-70-2	E421	41.0 mg/L	40 mg/L	102	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.198 mg/L	0.2 mg/L	99.1	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.197 mg/L	0.2 mg/L	98.4	70.0	130	----
		iron, dissolved	7439-89-6	E421	20.0 mg/L	20 mg/L	100	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.919 mg/L	1 mg/L	91.9	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.203 mg/L	0.2 mg/L	101	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.189 mg/L	0.2 mg/L	94.4	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.393 mg/L	0.4 mg/L	98.2	70.0	130	----
		potassium, dissolved	7440-09-7	E421	40.6 mg/L	40 mg/L	101	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.391 mg/L	0.4 mg/L	97.7	70.0	130	----
		silicon, dissolved	7440-21-3	E421	95.5 mg/L	100 mg/L	95.5	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		sodium, dissolved	7440-23-5	E421	20.0 mg/L	20 mg/L	99.8	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	185 mg/L	200 mg/L	92.7	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0387 mg/L	0.04 mg/L	96.7	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.189 mg/L	0.2 mg/L	94.5	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.395 mg/L	0.4 mg/L	98.8	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0413 mg/L	0.04 mg/L	103	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.995 mg/L	1 mg/L	99.5	70.0	130	----
		zinc, dissolved	7440-66-6	E421	4.07 mg/L	4 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 767686)										
CG2216732-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.398 mg/L	0.4 mg/L	99.4	70.0	130	----

Teck

COC ID: REP_LAEMP_LCO_2022_December_ALS

TURNAROUND TIME: Regular | RUSH: N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO		
Facility Name / Job #	Regional Effects Program - LCO LAEMP			Lab Name	ALS Calgary			Report Format / Distribution		Exce
Project Manager	Cybele Heddle			Lab Contact	Lyudmyla Shvets			Email 1:	aquascilab@teck.com	
Email	Cybele.Heddle@Teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	teckcoal@equisonline.com	
Address	421 Pine Ave			Address	2559 29 Street NE			Email 3:	Teck.Lab.Results@teck.com	X
								Email 4:	hannah.penner@teck.com	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	rhiannon.hodgson@minnow.ca	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada	Email 6:	lbowron@minnow.ca	X
Phone Number	250-910-8755			Phone Number	403 407 1794			PO number	VPO00816101	

SAMPLE DETAILS / ANALYSIS REQUESTED (Filtered - F; Field, L: Lab)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIL	F	N	F	N	F	N	N					
								PRESERV.	H2SO4	H2SO4	HCL	NONE	HNO3	HNO3	NONE					
								ANALYSIS	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	HG-T-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-METNHG-T-CL	TECKCOAL-ROUTINE-VA					
RG_LILC3_WS_LCO_LAEMP_2022-12-N	RG_LILC3	WS	NO	2022-12-01	09:45	G	7		✓	✓	✓	✓	✓	✓	✓					
RG_LCUT_WS_LCO_LAEMP_2022-12-N	RG_LCUT	WS	NO	2022-12-01	11:20	G	7		✓	✓	✓	✓	✓	✓	✓					
RG_RIVER_WS_LCO_LAEMP_2022-12-N	RG_RIVER	WS	NO	2022-12-01	13:00	G	7		✓	✓	✓	✓	✓	✓	✓					
RG_LISP24_WS_LCO_LAEMP_2022-12-N	RG_LISP24	WS	NO	2022-12-01	13:30	G	7		✓	✓	-	✓	✓	-	✓					
RG_LIDCOM_WS_LCO_LAEMP_2022-12-N	RG_LIDCOM	WS	NO	2022-12-01	15:00	G	7		✓	✓	✓	✓	✓	✓	✓					
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														

SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Rick Smit/Lotic Enviro	2022-12-01/17:00	NC	02/DEC/22 0850
			3°C	

SERVICE REQUEST (rush - subject to availability)				
Regular (default) X	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge				
Emergency (1 Business Day) - 100% surcharge	Sampler's Signature	Rick Smit	Date/Time	2022-12-01/17:00
For Emergency <1 Day, ASAP or Weekend - Contact ALS				

Environmental Division Calgary
Work Order Reference
CG2216739

Environmental Division Calgary
Work Order Reference
CG2216739

Telephone : +1 403 407 1800

WATER CHEMISTRY

ALS Laboratory Report CG2216778
(Finalized December 9, 2022)

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **CG2216778**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 03-Dec-2022 11:40
PO	: VPO00816101	Date Analysis Commenced	: 03-Dec-2022
C-O-C number	: REP_LAEMP_LCO_2022_December_AL	Issue Date	: 09-Dec-2022 17:49
Sampler	: Rick Smit		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Kevin Baxter	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Baxter	Team Leader - Inorganics	Metals, Calgary, Alberta
Mackenzie Lamoureux	Laboratory Analyst	Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Metals, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FO23_WS_LAEMP_LCO_2022-12_N	RG_LI8_WS_LAEMP_LCO_2022-12_N	----	----	----
					Client sampling date / time	02-Dec-2022 08:30	02-Dec-2022 09:45	----	----	----
						CG2216778-001	CG2216778-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
acidity (as CaCO3)	----	E283	2.0	mg/L		<2.0	<2.0	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		200	183	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L		244	223	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	9.2	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L		<1.0	5.5	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		200	192	----	----	----
conductivity	----	E100	2.0	µS/cm		805	802	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		456	453	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV		360	311	----	----	----
pH	----	E108	0.10	pH units		8.23	8.33	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		598	589	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L		<1.0	<1.0	----	----	----
turbidity	----	E121	0.10	NTU		0.20	0.18	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		7.20	12.1	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.215	0.278	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		<0.050 TKNI	<0.500 DLM, TKNI	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		10.9	7.01	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0014	0.0013	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0043	0.0026	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		240	255	----	----	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		<0.50	<0.50	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FO23_WS_LAEMP_LCO_2022-12_N	RG_LI8_WS_LAEMP_LCO_2022-12_N	----	----	----
					Client sampling date / time	02-Dec-2022 08:30	02-Dec-2022 09:45	----	----	----
						CG2216778-001	CG2216778-002	--------	--------	--------
						Result	Result	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		<0.50	<0.50	----	----	----
Ion Balance										
anion sum	----	EC101	0.10	meq/L		9.99	10.0	----	----	----
cation sum	----	EC101	0.10	meq/L		9.33	9.40	----	----	----
ion balance (cations/anions)	----	EC101	0.010	%		93.4	94.0	----	----	----
ion balance (APHA)	----	EC101	0.01	%		-3.42	-3.09	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0043	0.0037	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	0.00015	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00011	0.00013	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0903	0.0657	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L		<0.020	<0.020	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	0.011	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L		0.0220	0.0812	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		112	107	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00018	0.00024	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L		<0.10	<0.10	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		<0.010	<0.010	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0250	0.0335	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		52.2	53.0	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00057	0.00094	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00136	0.00260	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00100	0.00372	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		1.25	1.30	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L		51.5	40.8	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	RG_FO23_WS_LAEMP_LCO_2022-12_N	RG_LI8_WS_LAEMP_LCO_2022-12_N	----	----	----
					Client sampling date / time	02-Dec-2022 08:30	02-Dec-2022 09:45	----	----	----
						CG2216778-001	CG2216778-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
silicon, total	7440-21-3	E420	0.10	mg/L		2.35	2.23	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		4.66	7.54	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.190	0.210	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		90.3	93.6	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.00271	0.00330	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	0.0037	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		<0.0010	<0.0010	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	0.00017	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		<0.00010	0.00013	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0968	0.0699	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	<0.020	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	0.013	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.0196	0.0594	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		106	105	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		0.00010	0.00016	----	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L		<0.10	<0.10	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00020	<0.00020	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		<0.010	<0.010	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0277	0.0392	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		46.4	46.4	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00035	0.00070	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: RG_FO23_WS_LAEMP_LCO_2022-12_N	RG_LI8_WS_LAEMP_LCO_2022-12_N	----	----	----
					Client sampling date / time: 02-Dec-2022 08:30	02-Dec-2022 09:45	----	----	----
					CG2216778-001	CG2216778-002	--------	--------	--------
					Result	Result	----	----	----
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00129	0.00243	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00089	0.00323	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.22	1.25	----	----	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L	49.5	41.8	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.61	2.45	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	4.36	7.20	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.186	0.214	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	90.2	97.0	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00266	0.00351	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	0.0038	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----

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

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2216778**	Page	: 1 of 16
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 03-Dec-2022 11:40
PO	: VPO00816101	Issue Date	: 09-Dec-2022 17:50
C-O-C number	: REP_LAEMP_LCO_2022_December_AL		
Sampler	: Rick Smit		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_FO23_WS_LAEMP_LCO_2022-12_N	E298	02-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_LI8_WS_LAEMP_LCO_2022-12_N	E298	02-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E235.Br-L	02-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E235.Br-L	02-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E235.Cl-L	02-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E235.Cl-L	02-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E378-U	02-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E378-U	02-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	3 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E235.F	02-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E235.F	02-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E235.NO3-L	02-Dec-2022	03-Dec-2022	3 days	1 days	✓	03-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E235.NO3-L	02-Dec-2022	03-Dec-2022	3 days	1 days	✓	03-Dec-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E235.NO2-L	02-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E235.NO2-L	02-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E235.SO4	02-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
RG_LI8_WS_LAEMP_LCO_2022-12_N	E235.SO4	02-Dec-2022	03-Dec-2022	----	----		03-Dec-2022	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_FO23_WS_LAEMP_LCO_2022-12_N	E318	02-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
RG_LI8_WS_LAEMP_LCO_2022-12_N	E318	02-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	28 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_FO23_WS_LAEMP_LCO_2022-12_N	E372-U	02-Dec-2022	07-Dec-2022	----	----		09-Dec-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
RG_LI8_WS_LAEMP_LCO_2022-12_N	E372-U	02-Dec-2022	07-Dec-2022	----	----		09-Dec-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_FO23_WS_LAEMP_LCO_2022-12_N	E421.Cr-L	02-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved)										
RG_LI8_WS_LAEMP_LCO_2022-12_N	E421.Cr-L	02-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
RG_FO23_WS_LAEMP_LCO_2022-12_N	E509	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
RG_LI8_WS_LAEMP_LCO_2022-12_N	E509	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	28 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
RG_FO23_WS_LAEMP_LCO_2022-12_N	E421	02-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
RG_LI8_WS_LAEMP_LCO_2022-12_N	E421	02-Dec-2022	05-Dec-2022	----	----		05-Dec-2022	180 days	3 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_FO23_WS_LAEMP_LCO_2022-12_N	E358-L	02-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	2 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
RG_LI8_WS_LAEMP_LCO_2022-12_N	E358-L	02-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_FO23_WS_LAEMP_LCO_2022-12_N	E355-L	02-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
RG_LI8_WS_LAEMP_LCO_2022-12_N	E355-L	02-Dec-2022	04-Dec-2022	----	----		04-Dec-2022	28 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_FO23_WS_LAEMP_LCO_2022-12_N	E283	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	14 days	4 days	✓
Physical Tests : Acidity by Titration										
HDPE										
RG_LI8_WS_LAEMP_LCO_2022-12_N	E283	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
RG_FO23_WS_LAEMP_LCO_2022-12_N	E290	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	14 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E290	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	14 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E100	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E100	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	28 days	4 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E125	02-Dec-2022	----	----	----		06-Dec-2022	0.25 hrs	96 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E125	02-Dec-2022	----	----	----		06-Dec-2022	0.25 hrs	98 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E108	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	0.25 hrs	0.27 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E108	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	0.25 hrs	0.27 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E162	02-Dec-2022	----	----	----		06-Dec-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E162	02-Dec-2022	----	----	----		06-Dec-2022	7 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_FO23_WS_LAEMP_LCO_2022-12_N	E160-L	02-Dec-2022	----	----	----		08-Dec-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_LI8_WS_LAEMP_LCO_2022-12_N	E160-L	02-Dec-2022	----	----	----		08-Dec-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_FO23_WS_LAEMP_LCO_2022-12_N	E121	02-Dec-2022	----	----	----		04-Dec-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_LI8_WS_LAEMP_LCO_2022-12_N	E121	02-Dec-2022	----	----	----		04-Dec-2022	3 days	2 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_FO23_WS_LAEMP_LCO_2022-12_N	E420.Cr-L	02-Dec-2022	05-Dec-2022	----	----		06-Dec-2022	180 days	4 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) RG_LI8_WS_LAEMP_LCO_2022-12_N	E420.Cr-L	02-Dec-2022	05-Dec-2022	----	----		06-Dec-2022	180 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_FO23_WS_LAEMP_LCO_2022-12_N	E508	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) RG_LI8_WS_LAEMP_LCO_2022-12_N	E508	02-Dec-2022	06-Dec-2022	----	----		06-Dec-2022	28 days	4 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved) RG_FO23_WS_LAEMP_LCO_2022-12_N	E420	02-Dec-2022	05-Dec-2022	----	----		06-Dec-2022	180 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
RG_LI8_WS_LAEMP_LCO_2022-12_N	E420	02-Dec-2022	05-Dec-2022	----	----		06-Dec-2022	180 days	4 days	✓

Legend & Qualifier Definitions

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

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	769508	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	769012	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	767032	1	15	6.6	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	766812	1	10	10.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	766813	1	10	10.0	5.0	✓
Conductivity in Water	E100	769010	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767926	1	16	6.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	768827	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767925	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	767104	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	766872	1	9	11.1	5.0	✓
Fluoride in Water by IC	E235.F	766807	1	11	9.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	766814	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	766815	1	10	10.0	5.0	✓
ORP by Electrode	E125	767048	1	20	5.0	5.0	✓
pH by Meter	E108	769011	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	766809	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	768525	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	768003	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	767030	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	768869	1	19	5.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	768004	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	767105	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	770193	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	766870	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	769508	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	769012	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	767032	1	15	6.6	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	766812	1	10	10.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	766813	1	10	10.0	5.0	✓
Conductivity in Water	E100	769010	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767926	1	16	6.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	768827	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767925	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	767104	1	18	5.5	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	766872	1	9	11.1	5.0	✓
Fluoride in Water by IC	E235.F	766807	1	11	9.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	766814	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	766815	1	10	10.0	5.0	✓
ORP by Electrode	E125	767048	1	20	5.0	5.0	✓
pH by Meter	E108	769011	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	766809	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	768525	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	768003	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	767030	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	768869	1	19	5.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	768004	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	767105	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	770193	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	768530	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	766870	1	18	5.5	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	769508	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	769012	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	767032	1	15	6.6	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	766812	1	10	10.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	766813	1	10	10.0	5.0	✓
Conductivity in Water	E100	769010	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767926	1	16	6.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	768827	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767925	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	767104	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	766872	1	9	11.1	5.0	✓
Fluoride in Water by IC	E235.F	766807	1	11	9.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	766814	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	766815	1	10	10.0	5.0	✓
Sulfate in Water by IC	E235.SO4	766809	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	768525	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	768003	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	767030	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	768869	1	19	5.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	768004	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	767105	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	770193	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
TSS by Gravimetry (Low Level)	E160-L	768530	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	766870	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	767032	1	15	6.6	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	766812	1	10	10.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	766813	1	10	10.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	767926	1	16	6.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	768827	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	767925	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	767104	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	766872	1	9	11.1	5.0	✓
Fluoride in Water by IC	E235.F	766807	1	11	9.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	766814	1	10	10.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	766815	1	10	10.0	5.0	✓
Sulfate in Water by IC	E235.SO4	766809	1	19	5.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	768003	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	767030	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	768869	1	19	5.2	5.0	✓
Total metals in Water by CRC ICPMS	E420	768004	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	767105	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	770193	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH endpoint of 8.3
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN 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 Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	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 Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Calgary - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **CG2216778**	Page	: 1 of 18
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Cybele Heddle	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Ave Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	:	Telephone	: +1 403 407 1800
Project	: Regional Effects Program	Date Samples Received	: 03-Dec-2022 11:40
PO	: VPO00816101	Date Analysis Commenced	: 03-Dec-2022
C-O-C number	: REP_LAEMP_LCO_2022_December_AL	Issue Date	: 09-Dec-2022 17:49
Sampler	: Rick Smit ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Supervisor - Inorganic	Calgary Inorganics, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Kevin Baxter	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
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Ruifang Zheng	Analyst	Calgary Inorganics, Calgary, Alberta
Vladka Stamenova	Analyst	Calgary Inorganics, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 766870)											
CG2216768-002	Anonymous	turbidity	----	E121	0.10	NTU	1.37	1.34	1.77%	15%	----
Physical Tests (QC Lot: 767048)											
CG2216774-009	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	406	407	0.222%	15%	----
Physical Tests (QC Lot: 768525)											
CG2216768-014	Anonymous	solids, total dissolved [TDS]	----	E162	40	mg/L	1500	1480	1.07%	20%	----
Physical Tests (QC Lot: 769010)											
CG2216774-001	Anonymous	conductivity	----	E100	2.0	µS/cm	630	627	0.477%	10%	----
Physical Tests (QC Lot: 769011)											
CG2216774-001	Anonymous	pH	----	E108	0.10	pH units	8.01	8.08	0.870%	4%	----
Physical Tests (QC Lot: 769012)											
CG2216774-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	147	144	2.34%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	147	144	2.34%	20%	----
Physical Tests (QC Lot: 769508)											
CG2216773-001	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	15.8	14.7	1.1	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 766807)											
CG2216761-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.025	0.024	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 766809)											
CG2216761-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	14.2	14.0	1.52%	20%	----
Anions and Nutrients (QC Lot: 766812)											
CG2216770-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 766813)											
CG2216770-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	0.95	0.97	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 766814)											
CG2216770-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 766815)											
CG2216770-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 766872)											
CG2216770-004	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 767030)											
CG2216774-007	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	1.00	mg/L	1.28	1.36	0.081	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 767032)											
CG2216774-014	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0847	0.0837	1.19%	20%	----
Anions and Nutrients (QC Lot: 770193)											
CG2216774-004	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0048	0.0037	0.0011	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 767104)											
CG2216773-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	3.89	4.02	0.13	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 767105)											
CG2216773-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.62	5.66	0.708%	20%	----
Total Metals (QC Lot: 768003)											
CG2216773-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00089	0.00093	0.00004	Diff <2x LOR	----
Total Metals (QC Lot: 768004)											
CG2216773-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.220	0.248	12.1%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00029	0.00030	0.000007	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00075	0.00070	0.00005	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.999	0.975	2.40%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	0.032 µg/L	0.000041	0.000009	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.037	0.038	0.0006	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0722 µg/L	0.0000816	12.2%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	99.4	108	8.81%	20%	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.25 µg/L	0.00028	0.00002	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00109	0.00110	0.000010	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	1.30	1.34	3.02%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000431	0.000424	0.000007	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.712	0.719	0.981%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	37.6	39.0	3.56%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.212	0.214	1.22%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000272	0.000261	0.000011	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00116	0.00110	0.00006	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	8.18	8.07	1.30%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.546 µg/L	0.000514	5.99%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	3.41	3.55	3.83%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	0.000012	0.000014	0.000002	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: 768004) - continued											
CG2216773-001	Anonymous	sodium, total	7440-23-5	E420	0.050	mg/L	34.3	36.4	5.83%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.610	0.644	5.26%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	14.1	14.3	1.60%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000014	0.000016	0.000002	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	0.00083	0.00084	0.000002	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00261	0.00297	0.00036	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000353	0.000379	7.10%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00194	0.00206	0.00012	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0071	0.0074	0.0003	Diff <2x LOR	----
Total Metals (QC Lot: 768869)											
CG2216774-011	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 767925)											
CG2216773-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0041	0.0047	0.0006	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00037	0.00037	0.000001	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	1.74	1.71	1.66%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.025	0.025	0.0007	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0050 µg/L	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	105	109	4.14%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.994	0.993	0.127%	20%	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.492	0.494	0.367%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	39.9	39.1	2.11%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.183	0.184	0.501%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	9.75	9.76	0.0242%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	3.23 µg/L	0.00297	8.56%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	3.85	3.95	2.61%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	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: 767925) - continued											
CG2216773-001	Anonymous	sodium, dissolved	7440-23-5	E421	0.050	mg/L	42.2	42.3	0.272%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.740	0.730	1.45%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	22.0	23.0	4.66%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00044	0.00040	0.00004	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000242	0.000232	4.01%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00055	0.00056	0.000008	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 767926)											
CG2216773-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00017	0.00017	0.000001	Diff <2x LOR	----
Dissolved Metals (QC Lot: 768827)											
CG2216774-011	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 766870)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 768525)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 768530)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 769010)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 769012)						
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: 769508)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Anions and Nutrients (QCLot: 766807)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 766809)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 766812)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 766813)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 766814)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 766815)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 766872)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 767030)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 767032)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 770193)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 767104)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 767105)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 768003)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 768004)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
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	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 768004) - continued						
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
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	----
Total Metals (QCLot: 768869)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 767925)						
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	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
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	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 767925) - continued						
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	----
Dissolved Metals (QCLot: 767926)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 768827)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 766870)									
turbidity	----	E121	0.1	NTU	200 NTU	100.0	85.0	115	----
Physical Tests (QCLot: 767048)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	99.0	95.4	104	----
Physical Tests (QCLot: 768525)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	100.0	85.0	115	----
Physical Tests (QCLot: 768530)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	93.7	85.0	115	----
Physical Tests (QCLot: 769010)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	98.7	90.0	110	----
Physical Tests (QCLot: 769011)									
pH	----	E108	----	pH units	7 pH units	101	98.6	101	----
Physical Tests (QCLot: 769012)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	101	85.0	115	----
Physical Tests (QCLot: 769508)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 766807)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 766809)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	106	90.0	110	----
Anions and Nutrients (QCLot: 766812)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 766813)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 766814)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 766815)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 766872)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 767030)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	101	75.0	125	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 767032)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 770193)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	102	80.0	120	----
Organic / Inorganic Carbon (QCLot: 767104)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	93.1	80.0	120	----
Organic / Inorganic Carbon (QCLot: 767105)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	97.4	80.0	120	----
Total Metals (QCLot: 768003)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	94.7	80.0	120	----
Total Metals (QCLot: 768004)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	98.4	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	96.1	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	93.9	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	93.3	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	92.6	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	82.8	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	95.1	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	97.1	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	94.0	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	95.4	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	93.3	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	93.6	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	92.0	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.8	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	97.4	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	96.6	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	97.9	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	92.2	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	94.7	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	88.4	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	96.5	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	93.5	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 768004) - continued									
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	113	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	96.5	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	93.3	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.7	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	95.5	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	97.2	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	83.0	80.0	120	----
Total Metals (QCLot: 768869)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	106	80.0	120	----
Dissolved Metals (QCLot: 767925)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	102	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	97.0	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	96.3	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	96.6	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	103	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	95.2	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	94.4	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	99.1	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	104	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.8	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	107	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	97.3	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	92.9	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.0	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	91.5	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	105	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	90.3	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.0	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	98.3	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 767925) - continued									
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	97.7	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	95.4	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	100	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	104	80.0	120	----
Dissolved Metals (QCLot: 767926)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	99.7	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 766807)										
CG2216770-006	Anonymous	fluoride	16984-48-8	E235.F	1.03 mg/L	1 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 766809)										
CG2216761-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 766812)										
CG2216770-006	Anonymous	bromide	24959-67-9	E235.Br-L	0.526 mg/L	0.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 766813)										
CG2216770-006	Anonymous	chloride	16887-00-6	E235.Cl-L	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 766814)										
CG2216770-006	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.61 mg/L	2.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 766815)										
CG2216770-006	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.540 mg/L	0.5 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 766872)										
CG2216770-005	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0500 mg/L	0.05 mg/L	100	70.0	130	----
Anions and Nutrients (QCLot: 767030)										
CG2216774-008	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.58 mg/L	2.5 mg/L	103	70.0	130	----
Anions and Nutrients (QCLot: 767032)										
CG2216774-015	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.110 mg/L	0.1 mg/L	110	75.0	125	----
Anions and Nutrients (QCLot: 770193)										
CG2216774-005	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0448 mg/L	0.05 mg/L	89.7	70.0	130	----
Organic / Inorganic Carbon (QCLot: 767104)										
CG2216773-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	6.16 mg/L	5 mg/L	123	70.0	130	----
Organic / Inorganic Carbon (QCLot: 767105)										
CG2216773-001	Anonymous	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 768003)										
CG2216773-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.362 mg/L	0.4 mg/L	90.6	70.0	130	----
Total Metals (QCLot: 768004)										
CG2216773-002	Anonymous	aluminum, total	7429-90-5	E420	1.84 mg/L	2 mg/L	92.2	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 768004) - continued										
CG2216773-002	Anonymous	antimony, total	7440-36-0	E420	0.193 mg/L	0.2 mg/L	96.4	70.0	130	----
		arsenic, total	7440-38-2	E420	0.191 mg/L	0.2 mg/L	95.7	70.0	130	----
		barium, total	7440-39-3	E420	0.176 mg/L	0.2 mg/L	88.0	70.0	130	----
		beryllium, total	7440-41-7	E420	0.376 mg/L	0.4 mg/L	94.0	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0914 mg/L	0.1 mg/L	91.4	70.0	130	----
		boron, total	7440-42-8	E420	0.827 mg/L	1 mg/L	82.7	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0372 mg/L	0.04 mg/L	92.9	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.188 mg/L	0.2 mg/L	93.9	70.0	130	----
		copper, total	7440-50-8	E420	0.182 mg/L	0.2 mg/L	91.0	70.0	130	----
		iron, total	7439-89-6	E420	18.2 mg/L	20 mg/L	91.0	70.0	130	----
		lead, total	7439-92-1	E420	0.180 mg/L	0.2 mg/L	89.8	70.0	130	----
		lithium, total	7439-93-2	E420	0.912 mg/L	1 mg/L	91.2	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.190 mg/L	0.2 mg/L	95.1	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.180 mg/L	0.2 mg/L	89.8	70.0	130	----
		nickel, total	7440-02-0	E420	0.377 mg/L	0.4 mg/L	94.2	70.0	130	----
		potassium, total	7440-09-7	E420	37.6 mg/L	40 mg/L	94.0	70.0	130	----
		selenium, total	7782-49-2	E420	0.371 mg/L	0.4 mg/L	92.8	70.0	130	----
		silicon, total	7440-21-3	E420	86.9 mg/L	100 mg/L	86.9	70.0	130	----
		silver, total	7440-22-4	E420	0.0382 mg/L	0.04 mg/L	95.5	70.0	130	----
		sodium, total	7440-23-5	E420	18.5 mg/L	20 mg/L	92.6	70.0	130	----
		strontium, total	7440-24-6	E420	0.181 mg/L	0.2 mg/L	90.4	70.0	130	----
		sulfur, total	7704-34-9	E420	195 mg/L	200 mg/L	97.7	70.0	130	----
		thallium, total	7440-28-0	E420	0.0369 mg/L	0.04 mg/L	92.2	70.0	130	----
		tin, total	7440-31-5	E420	0.176 mg/L	0.2 mg/L	88.3	70.0	130	----
		titanium, total	7440-32-6	E420	0.369 mg/L	0.4 mg/L	92.3	70.0	130	----
		uranium, total	7440-61-1	E420	0.0346 mg/L	0.04 mg/L	86.6	70.0	130	----
		vanadium, total	7440-62-2	E420	0.930 mg/L	1 mg/L	93.0	70.0	130	----
		zinc, total	7440-66-6	E420	3.43 mg/L	4 mg/L	85.8	70.0	130	----
Total Metals (QCLot: 768869)										
CG2216774-012	Anonymous	mercury, total	7439-97-6	E508	0.000110 mg/L	0.0001 mg/L	110	70.0	130	----
Dissolved Metals (QCLot: 767925)										
CG2216773-002	Anonymous	aluminum, dissolved	7429-90-5	E421	1.87 mg/L	2 mg/L	93.7	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.198 mg/L	0.2 mg/L	99.3	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 767925) - continued										
CG2216773-002	Anonymous	arsenic, dissolved	7440-38-2	E421	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.199 mg/L	0.2 mg/L	99.6	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.390 mg/L	0.4 mg/L	97.4	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.902 mg/L	1 mg/L	90.2	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0414 mg/L	0.04 mg/L	103	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.199 mg/L	0.2 mg/L	99.3	70.0	130	----
		iron, dissolved	7439-89-6	E421	20.5 mg/L	20 mg/L	102	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.944 mg/L	1 mg/L	94.4	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.185 mg/L	0.2 mg/L	92.4	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.392 mg/L	0.4 mg/L	98.0	70.0	130	----
		potassium, dissolved	7440-09-7	E421	41.9 mg/L	40 mg/L	105	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.377 mg/L	0.4 mg/L	94.3	70.0	130	----
		silicon, dissolved	7440-21-3	E421	96.6 mg/L	100 mg/L	96.6	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		sodium, dissolved	7440-23-5	E421	19.6 mg/L	20 mg/L	97.8	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.190 mg/L	0.2 mg/L	95.1	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	164 mg/L	200 mg/L	81.9	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0393 mg/L	0.04 mg/L	98.3	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.191 mg/L	0.2 mg/L	95.6	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.394 mg/L	0.4 mg/L	98.4	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	1.00 mg/L	1 mg/L	100	70.0	130	----
		zinc, dissolved	7440-66-6	E421	4.28 mg/L	4 mg/L	107	70.0	130	----
Dissolved Metals (QCLot: 767926)										
CG2216773-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.410 mg/L	0.4 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 768827)										
CG2216774-012	Anonymous	mercury, dissolved	7439-97-6	E509	0.000102 mg/L	0.0001 mg/L	102	70.0	130	----

Teck

COC ID: REP_LAEMP_LCO_2022_December_ALS

TURNAROUND TIME: Regular | RUSH: N/A

PROJECT/CLIENT INFO			
Facility Name / Job	Regional Effects Program - LCO LAEMP		
Project Manager	Cybele Heddle		
Email	Cybele.Heddle@Teck.com		
Address	421 Pine Ave		
City	Sparwood	Province	BC
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Phone Number	250-910-8755		

LABORATORY			
Lab Name	ALS Calgary		
Lab Contact	Lyudmyla Shvets		
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City	Calgary	Province	AB
Postal Code	T1Y 7B5	Country	Canada
Phone Number	403 407 1794		

OTHER INFO				
Report Format / Distribution		Excel	PDF	EDD
Email 1:	[illegible]	X		
Email 2:	teckcoal@equisonline.com			X
Email 3:	Teck.Lab.Results@teck.com	X	X	X
Email 4:	hannah.penner@teck.com	X	X	X
Email 5:	rhiannon.hodgson@minnow.ca	X	X	X
Email 6:	lbowron@minnow.ca	X	X	X
PO number	VPO00816101			

SAMPLE DETAILS / ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	HG-T-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-METNHG-T-CL	TECKCOAL-ROUTINE-VA
Filtered								F	N	F	N	F	N	N
Preservative								H2SO4	H2SO4	HCL	NONE	HNO3	HNO3	NONE
RG_FO23-WS_LCO_LAEMP_2022-12-N	RG_FO23	WS	NO	2022-12-02	08:30	G	7	X	X	X	X	X	X	X
RG_LI8_WS_LCO_LAEMP_2022-12-N	RG_LI8	WS	NO	2022-12-02	09:45	G	7	X	X	X	X	X	X	X
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								
		WS	NO			G								

Environmental Division
Calgary
Work Order Reference
CG2216778

Telephone : +1 403 407 1800

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Rick Smit / Lotic environmental	2022-12-02/18:00	[signature]	12/03 11:40

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature	Rick Smit	Date/Time	2022-12-02 / 18:00
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Environmental Division
Calgary
Work Order Reference
CG2216778

SELENIUM SPECIATION

BAL Final Report 2205163

(Finalized May 27, 2022)

BROOKS APPLIED LABS
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May 27, 2022

Teck Resources Limited – Vancouver
Cybele Heddle
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
cybele.heddle@teck.com

Re: Regional Effects Program – LCO LAEMP

Dear Cybele Heddle,

On May 12, 2022, Brooks Applied Labs (BAL) received twenty-two (22) aqueous samples. The samples were logged-in for total recoverable selenium [*Se*], dissolved Se [*Se*], and Se speciation analyses, according to the chain-of-custody (COC) forms.

The **Sample ID** values listed on the chain-of-custody (COC) forms did not exactly match the corresponding Sample ID values on the container labels for 2205163-47, 2205163-50, and 2205163-59. The discrepancies are described in the table below.

Laboratory ID	Sample ID (*on COC form*)	Sample ID (*on container label*)
2205163-47	RG_LILC3_WS_LAEMP_LCO_2022-04_NP	RG_LILC3_WS_LAEMP_EVO_2021-04_NP
2205163-50	RG_LCUT_WS_LAEMP_LCO_2022-04_NP	RG_LCUT_WS_LAEMP_EVO_2021-04_NP
2205163-59	RG_FRUL_WS_LAEMP_LCO_2022-04_NP	RG_FRUL_WS_LAEMP_EVO_2021-04_NP

The sample fractions 2205163-47, 2205163-50, and 2205163-59 were logged in and reported using the **Sample ID** values described on the COC form (*column 2 in the table above*).

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

Total Recoverable and Dissolved Se
Each aqueous sample fraction for total recoverable or dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Se Speciation
Each aqueous sample was analyzed for Se speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively

coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [Se(IV)], selenate [Se(VI)], selenocyanate [SeCN], methylseleninic acid [MeSe(IV)], methaneselenonic acid [MeSe(VI)], selenomethionine [SeMet], selenosulfate [SeSO3], and dimethylselenoxide [DMSeO]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [Unk Se Sp].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional Se species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting Se species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances when a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the RPD of the MS/MSD set was not calculated (N/C).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited met all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute
Senior Project Manager
Brooks Applied Labs
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received	**MS**	matrix spike
BAL	Brooks Applied Labs	**MSD**	matrix spike duplicate
BLK	method blank	**ND**	non-detect
BS	blank spike	**NR**	non-reportable
CAL	calibration standard	**N/C**	not calculated
CCB	continuing calibration blank	**PS**	post preparation spike
CCV	continuing calibration verification	**REC**	percent recovery
COC	chain of custody record	**RPD**	relative percent difference
D	dissolved fraction	**SCV**	secondary calibration verification
DUP	duplicate	**SOP**	standard operating procedure
IBL	instrument blank	**SRM**	reference material
ICV	initial calibration verification	**T**	total fraction
MDL	method detection limit	**TR**	total recoverable fraction
MRL	method reporting limit		

Definition of Data Qualifiers

(Effective 3/23/2020)

E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.

H Holding time and/or preservation requirements not met. Please see narrative for explanation.

J Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.

J-1 Estimated value. A full explanation is presented in the narrative.

M Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.

N Spike recovery was not within acceptance criteria. Please see narrative for explanation.

R Rejected, unusable value. A full explanation is presented in the narrative.

U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.

X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.

Z Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022
Certificate Number: E87982-37

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod	Non-Potable Waters	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn
BAL-5000	Solids/Chemicals & Biological	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn Hg (Biological Only)
EPA 1640 Mod	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn Ag, As, Cr, Co, Se, Tl, V (ISO Only)
EPA 1631E Mod BAL-3100	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury
EPA 1632A Mod BAL-3300	Non-Potable Waters	Inorganic Arsenic (ISO Only)
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)
AOAC 2015.01 Mod BAL-5000	Food	As, Cd, Hg, Pb
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
	Biological by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)
BAL-4101	Food by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II) (ISO Only)
SM2340B	Non-Potable Waters	Hardness
SM 2540G BAL-0501	Solids/Chemicals & Biological	% Dry Weight

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_RIVER_WS_LAEMP_LCO_2022-04_NP	2205163-33	WS	Sample	05/03/2022	05/12/2022
RG_RIVER_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-34	WS	Sample	05/03/2022	05/12/2022
RG_RIVER_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-35	WS	Sample	05/03/2022	05/12/2022
RG_SLINE_WS_LAEMP_LCO_2022-04_NP	2205163-36	WS	Sample	05/03/2022	05/12/2022
RG_SLINE_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-37	WS	Sample	05/03/2022	05/12/2022
RG_SLINE_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-38	WS	Sample	05/03/2022	05/12/2022
RG_LI24_WS_LAEMP_LCO_2022_04_NP-NAL	2205163-39	WS	Sample	05/03/2022	05/12/2022
RG_LI24_WS_LAEMP_LCO_2022_04_NP-NAL	2205163-40	WS	Sample	05/03/2022	05/12/2022
RG_LI24_WS_LAEMP_LCO_2022-04_NP	2205163-41	WS	Sample	05/03/2022	05/12/2022
RG_LISP24_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-42	WS	Sample	05/03/2022	05/12/2022

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_LISP24_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-43	WS	Sample	05/03/2022	05/12/2022
RG_LISP24_WS_LAEMP_LCO_2022-04_NP	2205163-44	WS	Sample	05/03/2022	05/12/2022
RG_LILC3_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-45	WS	Sample	05/02/2022	05/12/2022
RG_LILC3_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-46	WS	Sample	05/02/2022	05/12/2022
RG_LILC3_WS_LAEMP_LCO_2022-04_NP	2205163-47	WS	Sample	05/02/2022	05/12/2022
RG_LCUT_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-48	WS	Sample	05/02/2022	05/12/2022
RG_LCUT_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-49	WS	Sample	05/02/2022	05/12/2022
RG_LCUT_WS_LAEMP_LCO_2022-04_NP	2205163-50	WS	Sample	05/02/2022	05/12/2022
RG_LI8_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-51	WS	Sample	05/04/2022	05/12/2022
RG_LI8_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-52	WS	Sample	05/04/2022	05/12/2022
RG_LI8_WS_LAEMP_LCO_2022-04_NP	2205163-53	WS	Sample	05/04/2022	05/12/2022
RG_FO23_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-54	WS	Sample	05/04/2022	05/12/2022
RG_FO23_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-55	WS	Sample	05/04/2022	05/12/2022
RG_FO23_WS_LAEMP_LCO_2022-04_NP	2205163-56	WS	Sample	05/04/2022	05/12/2022
RG_FRUL_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-57	WS	Sample	05/02/2022	05/12/2022
RG_FRUL_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-58	WS	Sample	05/02/2022	05/12/2022
RG_FRUL_WS_LAEMP_LCO_2022-04_NP	2205163-59	WS	Sample	05/02/2022	05/12/2022
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-60	WS	Sample	05/04/2022	05/12/2022
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-61	WS	Sample	05/04/2022	05/12/2022
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP	2205163-62	WS	Sample	05/04/2022	05/12/2022
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-63	WS	Sample	05/03/2022	05/12/2022

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP-NAL	2205163-64	WS	Sample	05/03/2022	05/12/2022
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP	2205163-65	WS	Sample	05/03/2022	05/12/2022

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	05/13/2022	05/14/2022	B221051	S220544
MeSe(IV)	Water	SOP BAL-4201	05/13/2022	05/14/2022	B221051	S220544
MeSe(VI)	Water	SOP BAL-4201	05/13/2022	05/14/2022	B221051	S220544
Se	Water	EPA 1638 Mod	05/16/2022	05/17/2022	B221065	S220549
Se(IV)	Water	SOP BAL-4201	05/13/2022	05/14/2022	B221051	S220544
Se(VI)	Water	SOP BAL-4201	05/13/2022	05/14/2022	B221051	S220544
SeCN	Water	SOP BAL-4201	05/13/2022	05/14/2022	B221051	S220544
SeMet	Water	SOP BAL-4201	05/13/2022	05/14/2022	B221051	S220544
SeSO3	Water	SOP BAL-4201	05/13/2022	05/14/2022	B221051	S220544
Unk Se Sp	Water	SOP BAL-4201	05/13/2022	05/14/2022	B221051	S220544

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_RIVER_WS_LAEMP_LCO_2022-04_NP										
2205163-33	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-33	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-33	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-33	Se(IV)	WS	D	0.028	J	0.010	0.075	µg/L	B221051	S220544
2205163-33	Se(VI)	WS	D	1.01		0.010	0.055	µg/L	B221051	S220544
2205163-33	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221051	S220544
2205163-33	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-33	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-33	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544
RG_RIVER_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-34	Se	WS	D	1.18		0.165	0.528	µg/L	B221065	S220549
RG_RIVER_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-35	Se	WS	TR	1.37		0.165	0.528	µg/L	B221065	S220549
RG_SLINE_WS_LAEMP_LCO_2022-04_NP										
2205163-36	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-36	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-36	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-36	Se(IV)	WS	D	0.031	J	0.010	0.075	µg/L	B221051	S220544
2205163-36	Se(VI)	WS	D	1.03		0.010	0.055	µg/L	B221051	S220544
2205163-36	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221051	S220544
2205163-36	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-36	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-36	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544
RG_SLINE_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-37	Se	WS	D	1.14		0.165	0.528	µg/L	B221065	S220549
RG_SLINE_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-38	Se	WS	TR	1.19		0.165	0.528	µg/L	B221065	S220549
RG_LI24_WS_LAEMP_LCO_2022_04_NP-NAL										
2205163-39	Se	WS	D	1.56		0.165	0.528	µg/L	B221065	S220549
RG_LI24_WS_LAEMP_LCO_2022_04_NP-NAL										
2205163-40	Se	WS	TR	1.55		0.165	0.528	µg/L	B221065	S220549

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI24_WS_LAEMP_LCO_2022-04_NP										
2205163-41	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-41	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-41	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-41	Se(IV)	WS	D	0.024	J	0.010	0.075	µg/L	B221051	S220544
2205163-41	Se(VI)	WS	D	1.40		0.010	0.055	µg/L	B221051	S220544
2205163-41	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221051	S220544
2205163-41	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-41	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-41	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544
RG_LISP24_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-42	Se	WS	D	42.6		0.165	0.528	µg/L	B221065	S220549
RG_LISP24_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-43	Se	WS	TR	40.0		0.165	0.528	µg/L	B221065	S220549
RG_LISP24_WS_LAEMP_LCO_2022-04_NP										
2205163-44	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-44	MeSe(IV)	WS	D	0.013	J	0.010	0.025	µg/L	B221051	S220544
2205163-44	MeSe(VI)	WS	D	0.028		0.010	0.025	µg/L	B221051	S220544
2205163-44	Se(IV)	WS	D	0.178		0.010	0.075	µg/L	B221051	S220544
2205163-44	Se(VI)	WS	D	37.7		0.010	0.055	µg/L	B221051	S220544
2205163-44	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221051	S220544
2205163-44	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-44	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-44	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544
RG_LILC3_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-45	Se	WS	D	57.4		0.165	0.528	µg/L	B221065	S220549
RG_LILC3_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-46	Se	WS	TR	58.1		0.165	0.528	µg/L	B221065	S220549

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LILC3_WS_LAEMP_LCO_2022-04_NP										
2205163-47	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-47	MeSe(IV)	WS	D	0.015	J	0.010	0.025	µg/L	B221051	S220544
2205163-47	MeSe(VI)	WS	D	0.046		0.010	0.025	µg/L	B221051	S220544
2205163-47	Se(IV)	WS	D	0.263		0.010	0.075	µg/L	B221051	S220544
2205163-47	Se(VI)	WS	D	57.1		0.010	0.055	µg/L	B221051	S220544
2205163-47	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221051	S220544
2205163-47	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-47	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-47	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544
RG_LCUT_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-48	Se	WS	D	69.2		0.165	0.528	µg/L	B221065	S220549
RG_LCUT_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-49	Se	WS	TR	64.7		0.165	0.528	µg/L	B221065	S220549
RG_LCUT_WS_LAEMP_LCO_2022-04_NP										
2205163-50	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-50	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-50	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-50	Se(IV)	WS	D	0.065	J	0.010	0.075	µg/L	B221051	S220544
2205163-50	Se(VI)	WS	D	55.0		0.010	0.055	µg/L	B221051	S220544
2205163-50	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221051	S220544
2205163-50	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-50	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-50	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544
RG_LI8_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-51	Se	WS	D	27.0		0.165	0.528	µg/L	B221065	S220549
RG_LI8_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-52	Se	WS	TR	26.9		0.165	0.528	µg/L	B221065	S220549

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI8_WS_LAEMP_LCO_2022-04_NP										
2205163-53	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-53	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-53	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-53	Se(IV)	WS	D	0.106		0.010	0.075	µg/L	B221051	S220544
2205163-53	Se(VI)	WS	D	27.5		0.010	0.055	µg/L	B221051	S220544
2205163-53	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221051	S220544
2205163-53	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-53	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-53	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544
RG_FO23_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-54	Se	WS	D	40.4		0.165	0.528	µg/L	B221065	S220549
RG_FO23_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-55	Se	WS	TR	40.5		0.165	0.528	µg/L	B221065	S220549
RG_FO23_WS_LAEMP_LCO_2022-04_NP										
2205163-56	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-56	MeSe(IV)	WS	D	0.015	J	0.010	0.025	µg/L	B221051	S220544
2205163-56	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-56	Se(IV)	WS	D	0.214		0.010	0.075	µg/L	B221051	S220544
2205163-56	Se(VI)	WS	D	41.4		0.010	0.055	µg/L	B221051	S220544
2205163-56	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221051	S220544
2205163-56	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-56	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-56	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544
RG_FRUL_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-57	Se	WS	D	48.3		0.165	0.528	µg/L	B221065	S220549
RG_FRUL_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-58	Se	WS	TR	44.8		0.165	0.528	µg/L	B221065	S220549

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FRUL_WS_LAEMP_LCO_2022-04_NP										
2205163-59	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-59	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-59	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-59	Se(IV)	WS	D	0.228		0.010	0.075	µg/L	B221051	S220544
2205163-59	Se(VI)	WS	D	39.7		0.010	0.055	µg/L	B221051	S220544
2205163-59	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221051	S220544
2205163-59	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-59	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-59	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-60	Se	WS	D	33.7		0.165	0.528	µg/L	B221065	S220549
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-61	Se	WS	TR	32.8		0.165	0.528	µg/L	B221065	S220549
RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP										
2205163-62	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-62	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-62	MeSe(VI)	WS	D	0.013	J	0.010	0.025	µg/L	B221051	S220544
2205163-62	Se(IV)	WS	D	0.136		0.010	0.075	µg/L	B221051	S220544
2205163-62	Se(VI)	WS	D	30.2		0.010	0.055	µg/L	B221051	S220544
2205163-62	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221051	S220544
2205163-62	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-62	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-62	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-63	Se	WS	D	≤ 0.165	U	0.165	0.528	µg/L	B221065	S220549
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP-NAL										
2205163-64	Se	WS	TR	≤ 0.165	U	0.165	0.528	µg/L	B221065	S220549

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FBLANK_WS_LAEMP_LCO_2022-04_NP										
2205163-65	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-65	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-65	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-65	Se(IV)	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544
2205163-65	Se(VI)	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-65	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221051	S220544
2205163-65	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221051	S220544
2205163-65	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221051	S220544
2205163-65	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221051	S220544

Accuracy & Precision Summary

Batch: B221051
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B221051-BS1	**Blank Spike, (2124033)**						
	MeSe(IV)		5.095	5.390	µg/L	106% 75-125	
	Se(IV)		5.000	5.004	µg/L	100% 75-125	
	Se(VI)		5.000	4.846	µg/L	97% 75-125	
	SeCN		5.015	4.718	µg/L	94% 75-125	
	SeMet		4.932	5.049	µg/L	102% 75-125	
B221051-DUP5	**Duplicate, (2205163-59)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		0.014	µg/L		N/C 25
	MeSe(VI)	ND		ND	µg/L		N/C 25
	Se(IV)	0.228		0.226	µg/L		0.8% 25
	Se(VI)	39.67		39.01	µg/L		2% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B221051-MS5	**Matrix Spike, (2205163-59)**						
	Se(IV)	0.228	4.900	4.858	µg/L	94% 75-125	
	Se(VI)	39.67	5.100	43.59	µg/L	NR 75-125	
	SeCN	ND	1.962	1.692	µg/L	86% 75-125	
	SeMet	ND	1.977	1.764	µg/L	89% 75-125	
B221051-MSD5	**Matrix Spike Duplicate, (2205163-59)**						
	Se(IV)	0.228	4.900	4.862	µg/L	95% 75-125	0.09% 25
	Se(VI)	39.67	5.100	43.71	µg/L	NR 75-125	N/C 25
	SeCN	ND	1.962	1.691	µg/L	86% 75-125	0.007% 25
	SeMet	ND	1.977	1.777	µg/L	90% 75-125	0.7% 25

Accuracy & Precision Summary

Batch: B221051
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B221051-DUP6	**Duplicate, (2205165-09)**						
	DMSeO	0.017		0.022	µg/L		*29%* 25
	MeSe(IV)	0.092		0.110	µg/L		18% 25
	MeSe(VI)	ND		ND	µg/L		N/C 25
	Se(IV)	0.810		0.795	µg/L		2% 25
	Se(VI)	0.265		0.248	µg/L		6% 25
	SeCN	2.252		2.125	µg/L		6% 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	0.044		0.028	µg/L		*45%* 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B221051-MS6	**Matrix Spike, (2205165-09)**						
	Se(IV)	0.810	4.900	5.211	µg/L	90% 75-125	
	Se(VI)	0.265	5.100	5.223	µg/L	97% 75-125	
	SeCN	2.252	1.962	3.983	µg/L	88% 75-125	
	SeMet	ND	1.977	1.736	µg/L	88% 75-125	
B221051-MSD6	**Matrix Spike Duplicate, (2205165-09)**						
	Se(IV)	0.810	4.900	5.185	µg/L	89% 75-125	0.5% 25
	Se(VI)	0.265	5.100	5.241	µg/L	98% 75-125	0.3% 25
	SeCN	2.252	1.962	3.955	µg/L	87% 75-125	0.7% 25
	SeMet	ND	1.977	1.737	µg/L	88% 75-125	0.02% 25

Accuracy & Precision Summary

Batch: B221065
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B221065-BS1	**Blank Spike, (2128022)**						
	Se		200.0	181.7	µg/L	91% 75-125	
B221065-BS2	**Blank Spike, (2128022)**						
	Se		200.0	183.4	µg/L	92% 75-125	
B221065-BS3	**Blank Spike, (2128022)**						
	Se		200.0	193.9	µg/L	97% 75-125	
B221065-SRM1	**Reference Material (2145011, TMDA 51.5 Reference Standard - Bottle 10 - SRM)**						
	Se		14.30	13.32	µg/L	93% 75-125	
B221065-SRM2	**Reference Material (2145011, TMDA 51.5 Reference Standard - Bottle 10 - SRM)**						
	Se		14.30	12.78	µg/L	89% 75-125	
B221065-SRM3	**Reference Material (2145011, TMDA 51.5 Reference Standard - Bottle 10 - SRM)**						
	Se		14.30	13.27	µg/L	93% 75-125	
B221065-DUP1	**Duplicate, (2205163-35)**						
	Se	1.368		1.184	µg/L		14% 20
B221065-MS1	**Matrix Spike, (2205163-35)**						
	Se	1.368	220.0	207.4	µg/L	94% 75-125	
B221065-MSD1	**Matrix Spike Duplicate, (2205163-35)**						
	Se	1.368	220.0	209.8	µg/L	95% 75-125	1% 20
B221065-DUP2	**Duplicate, (2205163-43)**						
	Se	39.97		41.64	µg/L		4% 20
B221065-MS2	**Matrix Spike, (2205163-43)**						
	Se	39.97	220.0	248.0	µg/L	95% 75-125	

Accuracy & Precision Summary

Batch: B221065
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B221065-MSD2	**Matrix Spike Duplicate, (2205163-43)**						
	Se	39.97	220.0	249.8	µg/L	95% 75-125	0.7% 20
B221065-DUP3	**Duplicate, (2205163-58)**						
	Se	44.78		45.66	µg/L		2% 20
B221065-MS3	**Matrix Spike, (2205163-58)**						
	Se	44.78	220.0	257.1	µg/L	96% 75-125	
B221065-MSD3	**Matrix Spike Duplicate, (2205163-58)**						
	Se	44.78	220.0	272.7	µg/L	104% 75-125	6% 20

Method Blanks & Reporting Limits

Batch: B221051
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B221051-BLK1	0.00	µg/L
B221051-BLK2	0.00	µg/L
B221051-BLK3	0.00	µg/L
B221051-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B221051-BLK1	0.00	µg/L
B221051-BLK2	0.00	µg/L
B221051-BLK3	0.00	µg/L
B221051-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B221051-BLK1	0.00	µg/L
B221051-BLK2	0.00	µg/L
B221051-BLK3	0.00	µg/L
B221051-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B221051-BLK1	0.003	µg/L
B221051-BLK2	0.00	µg/L
B221051-BLK3	0.00	µg/L
B221051-BLK4	0.00	µg/L

Average: 0.001
Limit: 0.015
MDL: 0.002
MRL: 0.015

Analyte: Se(VI)

Sample	Result	Units
B221051-BLK1	0.00	µg/L
B221051-BLK2	0.00	µg/L
B221051-BLK3	0.00	µg/L
B221051-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011
MDL: 0.002
MRL: 0.011

Analyte: SeCN

Sample	Result	Units
B221051-BLK1	0.00	µg/L
B221051-BLK2	0.00	µg/L
B221051-BLK3	0.00	µg/L
B221051-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.010
MDL: 0.002
MRL: 0.010

Analyte: SeMet

Sample	Result	Units
B221051-BLK1	0.00	µg/L
B221051-BLK2	0.00	µg/L
B221051-BLK3	0.00	µg/L
B221051-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B221051-BLK1	0.00	µg/L
B221051-BLK2	0.00	µg/L
B221051-BLK3	0.00	µg/L
B221051-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B221051-BLK1	0.00	µg/L
B221051-BLK2	0.00	µg/L
B221051-BLK3	0.00	µg/L
B221051-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Method Blanks & Reporting Limits

Batch: B221065
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B221065-BLK1	0.104	µg/L
B221065-BLK2	0.077	µg/L
B221065-BLK3	0.029	µg/L
B221065-BLK4	0.050	µg/L

Average: 0.065
Limit: 0.480

MDL: 0.150
MRL: 0.480

Sample Containers

Lab ID: 2205163-33
Sample: RG_RIVER_WS_LAEMP_LCO_2022-04_NP

Report Matrix: WS
Sample Type: Sample + Sum

Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 8 - 2205163
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 8 - 2205163
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 8 - 2205163

Sample Containers

Lab ID: 2205163-34
Sample: RG_RIVER_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-35
Sample: RG_RIVER_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-36
Sample: RG_SLINE_WS_LAEMP_LCO_2022-04_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 8 - 2205163
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 8 - 2205163
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 8 - 2205163

Lab ID: 2205163-37
Sample: RG_SLINE_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-38
Sample: RG_SLINE_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Sample Containers

Lab ID: 2205163-39
Sample: RG_LI24_WS_LAEMP_LCO_2022_04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-40
Sample: RG_LI24_WS_LAEMP_LCO_2022_04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-41
Sample: RG_LI24_WS_LAEMP_LCO_2022-04_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 8 - 2205163
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 8 - 2205163
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 8 - 2205163

Lab ID: 2205163-42
Sample: RG_LISP24_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-43
Sample: RG_LISP24_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Sample Containers

Lab ID: 2205163-44
Sample: RG_LISP24_WS_LAEMP_LCO_2022-04_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 8 - 2205163
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 8 - 2205163
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 8 - 2205163

Lab ID: 2205163-45
Sample: RG_LILC3_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/02/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-46
Sample: RG_LILC3_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/02/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-47
Sample: RG_LILC3_WS_LAEMP_LCO_2022-04_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/02/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 8 - 2205163
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 8 - 2205163
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 8 - 2205163

Sample Containers

Lab ID: 2205163-48
Sample: RG_LCUT_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/02/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-49
Sample: RG_LCUT_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/02/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-50
Sample: RG_LCUT_WS_LAEMP_LCO_2022-04_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/02/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 8 - 2205163
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 8 - 2205163
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 8 - 2205163

Lab ID: 2205163-51
Sample: RG_LI8_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/04/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-52
Sample: RG_LI8_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/04/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Sample Containers

Lab ID: 2205163-53
Sample: RG_LI8_WS_LAEMP_LCO_2022-04_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/04/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 8 - 2205163
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 8 - 2205163
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 8 - 2205163

Lab ID: 2205163-54
Sample: RG_FO23_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/04/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-55
Sample: RG_FO23_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/04/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-56
Sample: RG_FO23_WS_LAEMP_LCO_2022-04_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/04/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 8 - 2205163
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 8 - 2205163
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 8 - 2205163

Sample Containers

Lab ID: 2205163-57
Sample: RG_FRUL_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/02/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-58
Sample: RG_FRUL_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/02/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-59
Sample: RG_FRUL_WS_LAEMP_LCO_2022-04_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/02/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 8 - 2205163
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 8 - 2205163
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 8 - 2205163

Lab ID: 2205163-60
Sample: RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/04/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-61
Sample: RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/04/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Sample Containers

Lab ID: 2205163-62
Sample: RG_LIDCOM_WS_LAEMP_LCO_2022-04_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/04/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 8 - 2205163
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 8 - 2205163
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 8 - 2205163

Lab ID: 2205163-63
Sample: RG_FBLANK_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-64
Sample: RG_FBLANK_WS_LAEMP_LCO_2022-04_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2152004	<2	Cooler 9 - 2205163

Lab ID: 2205163-65
Sample: RG_FBLANK_WS_LAEMP_LCO_2022-04_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 05/03/2022
Received: 05/12/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 8 - 2205163
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 8 - 2205163
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 8 - 2205163

Shipping Containers

Cooler 8 - 2205163

Received: May 12, 2022 7:20
Tracking No: PAPS# RWHV92276 via Courier
Coolant Type: Blue Ice
Temperature: -1.2 °C

Description:
Damaged in transit? No
Returned to client? No
Comments: IR#33

Custody seals present? No
Custody seals intact? No
COC present? Yes

Cooler 9 - 2205163

Received: May 12, 2022 7:20
Tracking No: PAPS# RWHV92276 via Courier
Coolant Type: Blue Ice
Temperature: 1.8 °C

Description: Large Cooler
Damaged in transit? No
Returned to client? No
Comments: IR#33

Custody seals present? No
Custody seals intact? No
COC present? No

Confidential

Teck

BAL Final Report 2205163

COC ID:	REP_LAEMP_LCO_2022_APR_BROOKS	TURNAROUND TIME:	Regular	RUSH:	N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	Brooks Applied Labs			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Ben Wozniak			Email 1:	aquascilab@teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Ben@brooksapplied.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	18804 North Creek Parkway			Email 3:	Teck.Lab.Results@teck.com	X	X	X
					Suite 100			Email 4:	Jessica.Ritz@Teck.com	X	X	X
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 5:	Tyler.Mehler@Minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	United S	Email 6:	lbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	(206) 753-6158			PO number	VPO00817033			

SAMPLE DETAILS								ANALYSIS REQUESTED														Filtered - F: Field, L: Lab, FL: Field & Lab, N: None
								FIL.		F												
								PRESERV.		HNO3	HNO3											
Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	Brooks_Se_Speciation	Brooks_Se_D	Brooks_Se_T											
RG-L124_WS_LAEMP_LCO_2022-04_NP	RG-L124	WS	NO	22/05/03	11:15	G	1		X													
RG-L124-WS-LAEMP_LCO_2022-04_NP-NAL	RG-L124	WS	NO	22/05/03	11:15	G	2			X	X											
RG-RIVER-WS-LAEMP-LCO_2022-04-NP	RG-RIVER	WS	NO	22/05/03	15:30	G	1		X													
RG-RIVER-WS-LAEMP-LCO_2022-04-NP-NAL	RG-RIVER	WS	NO	22/05/03	15:30	G	2			X	X											
RG-LISP24_WS-LAEMP_LCO_2022-04_NP	RG-LISP24	WS	NO	22/05/03	09:00	G	1		X													
RG-LISP24-WS-LAEMP-LCO_2022-04_NP-NAL	RG-LISP24	WS	NO	22/05/03	09:00	G	2			X	X											
RG-SLINE-WS-LAEMP-LCO-2022-04-NP	RG-SLINE	WS	NO	22/05/03	13:30	G	1		X													
RG-SLINE-WS-LAEMP-LCO_2022-04-NP-NAL	RG-SLINE	WS	NO	22/05/03	13:30	G	2			X	X											
RG-LCUT-WS-LAEMP-LCO-2022-04-NP	RG-LCUT	WS	NO	22/05/02	13:00	G	1		X													
RG-LCUT-WS-LAEMP-LCO-2022-04-NP-NAL	RG-LCUT	WS	NO	22/05/02	13:00	G	2			X	X											
RG-LILC3-WS-LAEMP-LCO-2022-04-NP-NAL	RG-LILC3	WS	NO	22/05/02	14:30	G	1		X													
RG-LILC3-WS-LAEMP-LCO-2022-04-NP-NAL	RG-LILC3	WS	NO	22/05/02	14:30	G	2			X	X											
RG-FRUL-WS-LAEMP-LCO-2022-04-NP	RG-FRUL	WS	NO	22/05/02	10:20	G	1		X													
RG-FRUL-WS-LAEMP-LCO-2022-04-NP-NAL	RG-FRUL	WS	NO	22/05/02	10:20	G	2			X	X											

DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	BAL	5/12/22 7:20

SERVICE REQUEST (rush - subject to availability)

Regular (default)	X
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Emma Thompson	Mobile #	250 421 3572
Sampler's Signature	Emma Thompson	Date/Time	2022/05/04 14:00

Confidential Teck

BAL Final Report 2205163

COC ID: REP_LAEMP_LCO_2022_APR_BROOKS | TURNAROUND TIME: Regular | RUSH: N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	Brooks Applied Labs			Report Format / Distribution	Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Ben Wozniak			Email 1: aquascilab@teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Ben@brooksapplied.com			Email 2: teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	18804 North Creek Parkway			Email 3: Teck.Lab.Results@teck.com	X	X	X
					Suite 100			Email 4: Jessica.Ritz@Teck.com	X	X	X
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 5: Tyler.Mehler@Minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	United S	Email 6: lbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	(206) 753-6158			PO number	VPO00817033		

SAMPLE DETAILS | ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIL.		F										
								PRESERV.		HNO3	HNO3									
								ANALYSIS	Brooks_Se_Speciation	Brooks_Se_D	Brooks_Se_T									
RG-LIDCOM-WS-LAEMP-LCO-2022-04-NP	RG. LIDCOM	WS	NO	22/05/04	10:30	G	1		X											
RG-LIDCOM-WS-LAEMP-LCO-2022-04-NP-NAL	RG. LIDCOM	WS	NO	22/05/04	10:30	G	2			X	X									
RG-L18-WS-LAEMP-LCO-2022-04-NP	RG. L18	WS	NO	22/05/04	09:30	G	1		X											
RG-L18-WS-LAEMP-LCO-2022-04-NP-NAL	RG. L18	WS	NO	22/05/04	09:30	G	2			X	X									
RG-FO23-WS-LAEMP-LCO-2022-04-NP	RG. FO23	WS	NO	22/05/04	07:30	G	1		X											
RG-FO23-WS-LAEMP-LCO-2022-04-NP-NAL	RG. FO23	WS	NO	22/05/04	07:30	G	2			X	X									
RG-FBLANK-WS-LAEMP-LCO-2022-04-NP	RG. FBLANK	WS	NO	22/05/03	16:00	G	1		X											
RG-FBLANK-WS-LAEMP-LCO-2022-04-NP-NAL	RG. FBLANK	WS	NO	22/05/03	16:00	G	2			X	X									
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														
		WS	NO			G														

DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	LKW/BAL	5/12/22 7:20

SERVICE REQUEST (rush - subject to availability)

Regular (default)	X
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Emma Thompson	Mobile #	250 421 3572
Sampler's Signature	Emma T	Date/Time	2022/05/04 14:00

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

No. 92276

Sparwood, BC
Terrace, BC
Red Deer, AB

Vancouver, BC
Calgary, AB
Montreal, QC

Prince George, BC
Edmonton, AB
Spokane, WA

Elkford, BC
Ft. McMurray, AB
Shelby, MT

Tumbler Ridge, BC
Hinton, AB
Gillette, WY

INVOICE TO	DATE
BILL OF LADING #	PURCHASE ORDER NUMBEP
SHIPPER (FROM)	CONSIGNEE (TO)
STREET	STREET
CITY/PROVINCE POSTAL CODE	CITY/PROVINCE POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
PAPS # RWHV92276		

FREIGHT CHARGES
SHIPPER TO CHECK
☐PREPAID ☐COLLECT
If not indicated, shipping will automatically move collect

FEE ______
WAITING ______
XPU ______
CHARGES ______
FSC ______
US ______
SUB TOTAL ______
GST ______
TOTAL $ ______
IF AT OWNER'S RISK, WRITE ORD HERE ______

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $

DRIVER'S SIGNATURE - PICK UP BY	PICK UP TIME	DRIVER'S SIGNATURE - DELIVERY BY	FINISH TIME
		X [signature]	X

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice thereof setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, or in the case of failure to make delivery within nine (9) months from the date of shipment. (b) The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consigned at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT	CONSIGNEE PRINT: Anaïs Gentilhomme	DATE: X 5/12/22	4
SHIPPER SIGN	CONSIGNEE SIGN: [signature]	TIME: X 7:20	

GST # 864540398RT0001 — NUMBER OF PIECES RECEIVED

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROD: Shipper

ARGOS PRINTING

Cooler ID: Cooler 9 **COC (Y/N)** **Temperature:** 1.8 **IR:** 33

Coolant Type: Ice (Blue Ice) Ambient

Notes:

Sampling Locations:	RG		EV_DC1		~~RG LCO~~		LC			
Sample Types:	(T/D)	(SP)	T/D	(SP)	(T/D)	(SP)	T/D	(SP)	T/D	SP
Container Types:	40mL glass	60mL plastic		60mL black plastic	40mL glass	125mL plastic		125mL plastic		

Opened By: UW **Date:** 5/12/22

Effective 7/29/20 EE UW 5/12/22

COPY

2205163

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 92276

Sparwood, BC / Terrace, BC / Red Deer, AB
Vancouver, BC / Calgary, AB / Montreal, QC
Prince George, BC / Edmonton, AB / Spokane, WA
Elkford, BC / Ft. McMurray, AB / Shelby, MT
Tumbler Ridge, BC / Hinton, AB / Gillette, WY

INVOICE TO	DATE
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM)	CONSIGNEE (TO)
STREET	STREET
CITY/PROVINCE / POSTAL CODE	CITY/PROVINCE / POSTAL CODE
SPECIAL INSTRUCTIONS	

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
	PAPS # RWHV92276	

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $

DRIVER'S SIGNATURE - PICK UP BY	PICK UP TIME	DRIVER'S SIGNATURE - DELIVERY BY	FINISH TIME
		X [signature]	X

FREIGHT CHARGES
SHIPPER TO CHECK
☐ PREPAID ☐ COLLECT
If not indicated, shipping will automatically move collect.

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
IF AT OWNER'S RISK, WRITE ORD HERE

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice thereof setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, or in the case of failure to make delivery within nine (9) months from the date of shipment. (b) The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consignee at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT	CONSIGNEE PRINT: Anaïs Gentilhomme	DATE: X 5/12/22
SHIPPER SIGN	CONSIGNEE SIGN: [signature]	TIME: X 7:20

NUMBER OF PIECES RECEIVED: 4

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROD: Shipper GST # 864540398RT0001

AMIGOS PRINTING

Cooler ID: Cooler 8 **COC (Y/N):** Y **Temperature:** 1.2 **IR:** 33

Coolant Type: Ice **Blue Ice** (circled) Ambient

Notes: ① RG

Sampling Locations: ~~ELO LAEMP~~ RG LC

	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Sample Types:		SP (circled)		SP (circled)		SP (circled)				
Container Types:		125mL plastic		125 mL plastic		125mL plastic				

Opened By: WW **Date:** 5/12/22

Effective 7/29/20 OCE WW 5/12/22 COPY Revision 00

SELENIUM SPECIATION

BAL Final Report 2207261

(Finalized August 4, 2022)

BROOKS APPLIED LABS
13751 Lake City Way NE, Ste 108, Seattle, WA 98125 • USA • T:206-632-6206 • info@brooksapplied.com

August 4, 2022

Teck Resources Limited – Vancouver
Cybele Heddle
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
cybele.heddle@teck.com

Re: Regional Effects Program – LCO LAEMP

Dear Cybele Heddle,

On July 21, 2022, Brooks Applied Labs (BAL) received twenty-two (22) aqueous samples. The samples were logged-in for total recoverable selenium [*Se*], dissolved Se, and Se speciation analyses, according to the chain-of-custody (COC) form.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

Total Recoverable and Dissolved Se
Each aqueous sample fraction for total recoverable or dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Se Speciation
Each aqueous sample was analyzed for Se speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [Se(IV)], selenate [Se(VI)], selenocyanate [SeCN], methylseleninic acid [MeSe(IV)], methaneselenonic acid [MeSe(VI)], selenomethionine [SeMet], selenosulfate [SeSO3], and dimethylselenoxide [DMSeO]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [Unk Se Sp].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional Se species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting Se species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

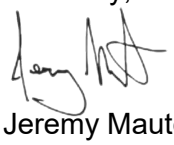
In instances when a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the RPD of the MS/MSD set was not calculated (N/C).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited met all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,



Jeremy Maute
Senior Project Manager
Brooks Applied Labs
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received
BAL	Brooks Applied Labs
BLK	method blank
BS	blank spike
CAL	calibration standard
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain of custody record
D	dissolved fraction
DUP	duplicate
IBL	instrument blank
ICV	initial calibration verification
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
NR	non-reportable
N/C	not calculated
PS	post preparation spike
REC	percent recovery
RPD	relative percent difference
SCV	secondary calibration verification
SOP	standard operating procedure
SRM	reference material
T	total fraction
TR	total recoverable fraction

Definition of Data Qualifiers

(Effective 3/23/2020)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022
Certificate Number: E87982-37

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod	Non-Potable Waters	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn
BAL-5000	Solids/Chemicals & Biological	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn Hg (Biological Only)
EPA 1640 Mod	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn Ag, As, Cr, Co, Se, Tl, V (ISO Only)
EPA 1631E Mod BAL-3100	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury
EPA 1632A Mod BAL-3300	Non-Potable Waters	Inorganic Arsenic (ISO Only)
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)
AOAC 2015.01 Mod BAL-5000	Food	As, Cd, Hg, Pb
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
	Biological by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)
BAL-4101	Food by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II) (ISO Only)
SM2340B	Non-Potable Waters	Hardness
SM 2540G BAL-0501	Solids/Chemicals & Biological	% Dry Weight

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_RIVER_WS_LAEMP_LCO_2022-07_NP_NAL	2207261-33	WS	Sample	07/12/2022	07/21/2022
RG_RIVER_WS_LAEMP_LCO_2022-07_N	2207261-34	WS	Sample	07/12/2022	07/21/2022
RG_RIVER_WS_LAEMP_LCO_2022-07_N	2207261-35	WS	Sample	07/12/2022	07/21/2022
RG_SLINE_WS_LAEMP_LCO_2022-07_NP_NAL	2207261-36	WS	Sample	07/12/2022	07/21/2022
RG_SLINE_WS_LAEMP_LCO_2022-07_N	2207261-37	WS	Sample	07/12/2022	07/21/2022
RG_SLINE_WS_LAEMP_LCO_2022-07_N	2207261-38	WS	Sample	07/12/2022	07/21/2022
RG_LI24_WS_LAEMP_LCO_2022_07_NP_NAL	2207261-39	WS	Sample	07/11/2022	07/21/2022
RG_LI24_WS_LAEMP_LCO_2022-07_N	2207261-40	WS	Sample	07/11/2022	07/21/2022
RG_LI24_WS_LAEMP_LCO_2022-07_N	2207261-41	WS	Sample	07/11/2022	07/21/2022
RG_LISP24_WS_LAEMP_LCO_2022-07_NP_NAL	2207261-42	WS	Sample	07/13/2022	07/21/2022

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_LISP24_WS_LAEMP_LCO_2022-07_NP	2207261-43	WS	Sample	07/13/2022	07/21/2022
RG_LISP24_WS_LAEMP_LCO_2022-07_N	2207261-44	WS	Sample	07/13/2022	07/21/2022
RG_LILC3_WS_LAEMP_LCO_2022-07_NP_NAL	2207261-45	WS	Sample	07/12/2022	07/21/2022
RG_LILC3_WS_LAEMP_LCO_2022-07_N	2207261-46	WS	Sample	07/12/2022	07/21/2022
RG_LILC3_WS_LAEMP_LCO_2022-07_N	2207261-47	WS	Sample	07/12/2022	07/21/2022
RG_LCUT_WS_LAEMP_LCO_2022-07_NP_NAL	2207261-48	WS	Sample	07/12/2022	07/21/2022
RG_LCUT_WS_LAEMP_LCO_2022-07_N	2207261-49	WS	Sample	07/12/2022	07/21/2022
RG_LCUT_WS_LAEMP_LCO_2022-07_N	2207261-50	WS	Sample	07/12/2022	07/21/2022
RG_LI8_WS_LAEMP_LCO_2022-07_NP_NAL	2207261-51	WS	Sample	07/14/2022	07/21/2022
RG_LI8_WS_LAEMP_LCO_2022-07_N	2207261-52	WS	Sample	07/14/2022	07/21/2022
RG_LI8_WS_LAEMP_LCO_2022-07_N	2207261-53	WS	Sample	07/14/2022	07/21/2022
RG_FO23_WS_LAEMP_LCO_2022-07_NP_NAL	2207261-54	WS	Sample	07/11/2022	07/21/2022
RG_FO23_WS_LAEMP_LCO_2022-07_N	2207261-55	WS	Sample	07/11/2022	07/21/2022
RG_FO23_WS_LAEMP_LCO_2022-07_N	2207261-56	WS	Sample	07/11/2022	07/21/2022
RG_FRUL_WS_LAEMP_LCO_2022-07_NP_NAL	2207261-57	WS	Sample	07/13/2022	07/21/2022
RG_FRUL_WS_LAEMP_LCO_2022-07_N	2207261-58	WS	Sample	07/13/2022	07/21/2022
RG_FRUL_WS_LAEMP_LCO_2022-07_N	2207261-59	WS	Sample	07/13/2022	07/21/2022
RG_LIDCOM_WS_LAEMP_LCO_2022-07_NP_NAL	2207261-60	WS	Sample	07/14/2022	07/21/2022
RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	2207261-61	WS	Sample	07/14/2022	07/21/2022
RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	2207261-62	WS	Sample	07/14/2022	07/21/2022
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP_NAL	2207261-63	WS	Sample	07/11/2022	07/21/2022

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FBLANK_WS_LAEMP_LCO_2022-07_N	2207261-64	WS	Sample	07/11/2022	07/21/2022
RG_FBLANK_WS_LAEMP_LCO_2022-07_N	2207261-65	WS	Sample	07/11/2022	07/21/2022

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	07/26/2022	07/29/2022	B221623	S220791
MeSe(IV)	Water	SOP BAL-4201	07/26/2022	07/29/2022	B221623	S220791
MeSe(VI)	Water	SOP BAL-4201	07/26/2022	07/29/2022	B221623	S220791
Se	Water	EPA 1638 Mod	07/26/2022	07/28/2022	B221657	S220779
Se(IV)	Water	SOP BAL-4201	07/26/2022	07/29/2022	B221623	S220791
Se(VI)	Water	SOP BAL-4201	07/26/2022	07/29/2022	B221623	S220791
SeCN	Water	SOP BAL-4201	07/26/2022	07/29/2022	B221623	S220791
SeMet	Water	SOP BAL-4201	07/26/2022	07/29/2022	B221623	S220791
SeSO3	Water	SOP BAL-4201	07/26/2022	07/29/2022	B221623	S220791
Unk Se Sp	Water	SOP BAL-4201	07/26/2022	07/29/2022	B221623	S220791

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_RIVER_WS_LAEMP_LCO_2022-07_NP_NAL										
2207261-33	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-33	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-33	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-33	Se(IV)	WS	D	0.079		0.020	0.075	µg/L	B221623	S220791
2207261-33	Se(VI)	WS	D	33.2		0.010	0.055	µg/L	B221623	S220791
2207261-33	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221623	S220791
2207261-33	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-33	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221623	S220791
2207261-33	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221623	S220791
RG_RIVER_WS_LAEMP_LCO_2022-07_N										
2207261-34	Se	WS	D	35.1		0.165	0.528	µg/L	B221657	S220779
RG_RIVER_WS_LAEMP_LCO_2022-07_N										
2207261-35	Se	WS	TR	35.8		0.165	0.528	µg/L	B221657	S220779
RG_SLINE_WS_LAEMP_LCO_2022-07_NP_NAL										
2207261-36	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-36	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-36	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-36	Se(IV)	WS	D	≤ 0.020	U	0.020	0.075	µg/L	B221623	S220791
2207261-36	Se(VI)	WS	D	0.636		0.010	0.055	µg/L	B221623	S220791
2207261-36	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221623	S220791
2207261-36	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-36	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221623	S220791
2207261-36	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221623	S220791
RG_SLINE_WS_LAEMP_LCO_2022-07_N										
2207261-37	Se	WS	D	0.943		0.165	0.528	µg/L	B221657	S220779
RG_SLINE_WS_LAEMP_LCO_2022-07_N										
2207261-38	Se	WS	TR	0.957		0.165	0.528	µg/L	B221657	S220779

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI24_WS_LAEMP_LCO_2022_07_NP_NAL										
2207261-39	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-39	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-39	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-39	Se(IV)	WS	D	≤ 0.020	U	0.020	0.075	µg/L	B221623	S220791
2207261-39	Se(VI)	WS	D	1.70		0.010	0.055	µg/L	B221623	S220791
2207261-39	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221623	S220791
2207261-39	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-39	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221623	S220791
2207261-39	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221623	S220791
RG_LI24_WS_LAEMP_LCO_2022-07_N										
2207261-40	Se	WS	D	1.81		0.165	0.528	µg/L	B221657	S220779
RG_LI24_WS_LAEMP_LCO_2022-07_N										
2207261-41	Se	WS	TR	1.87		0.165	0.528	µg/L	B221657	S220779
RG_LISP24_WS_LAEMP_LCO_2022-07_NP_NAL										
2207261-42	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-42	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-42	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-42	Se(IV)	WS	D	0.054	J	0.020	0.075	µg/L	B221623	S220791
2207261-42	Se(VI)	WS	D	23.2		0.010	0.055	µg/L	B221623	S220791
2207261-42	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221623	S220791
2207261-42	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-42	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221623	S220791
2207261-42	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221623	S220791
RG_LISP24_WS_LAEMP_LCO_2022-07_NP										
2207261-43	Se	WS	D	26.9		0.165	0.528	µg/L	B221657	S220779
RG_LISP24_WS_LAEMP_LCO_2022-07_N										
2207261-44	Se	WS	TR	24.6		0.165	0.528	µg/L	B221657	S220779

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LILC3_WS_LAEMP_LCO_2022-07_NP_NAL										
2207261-45	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-45	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-45	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-45	Se(IV)	WS	D	0.068	J	0.020	0.075	µg/L	B221623	S220791
2207261-45	Se(VI)	WS	D	30.5		0.010	0.055	µg/L	B221623	S220791
2207261-45	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221623	S220791
2207261-45	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-45	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221623	S220791
2207261-45	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221623	S220791
RG_LILC3_WS_LAEMP_LCO_2022-07_N										
2207261-46	Se	WS	D	35.2		0.165	0.528	µg/L	B221657	S220779
RG_LILC3_WS_LAEMP_LCO_2022-07_N										
2207261-47	Se	WS	TR	34.5		0.165	0.528	µg/L	B221657	S220779
RG_LCUT_WS_LAEMP_LCO_2022-07_NP_NAL										
2207261-48	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-48	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-48	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-48	Se(IV)	WS	D	0.069	J	0.020	0.075	µg/L	B221623	S220791
2207261-48	Se(VI)	WS	D	21.9		0.010	0.055	µg/L	B221623	S220791
2207261-48	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221623	S220791
2207261-48	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-48	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221623	S220791
2207261-48	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221623	S220791
RG_LCUT_WS_LAEMP_LCO_2022-07_N										
2207261-49	Se	WS	D	23.9		0.165	0.528	µg/L	B221657	S220779
RG_LCUT_WS_LAEMP_LCO_2022-07_N										
2207261-50	Se	WS	TR	24.3		0.165	0.528	µg/L	B221657	S220779

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI8_WS_LAEMP_LCO_2022-07_NP_NAL										
2207261-51	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-51	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-51	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-51	Se(IV)	WS	D	0.048	J	0.020	0.075	µg/L	B221623	S220791
2207261-51	Se(VI)	WS	D	20.0		0.010	0.055	µg/L	B221623	S220791
2207261-51	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221623	S220791
2207261-51	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-51	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221623	S220791
2207261-51	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221623	S220791
RG_LI8_WS_LAEMP_LCO_2022-07_N										
2207261-52	Se	WS	D	21.9		0.165	0.528	µg/L	B221657	S220779
RG_LI8_WS_LAEMP_LCO_2022-07_N										
2207261-53	Se	WS	TR	20.6		0.165	0.528	µg/L	B221657	S220779
RG_FO23_WS_LAEMP_LCO_2022-07_NP_NAL										
2207261-54	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-54	MeSe(IV)	WS	D	0.011	J	0.010	0.025	µg/L	B221623	S220791
2207261-54	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-54	Se(IV)	WS	D	0.100		0.020	0.075	µg/L	B221623	S220791
2207261-54	Se(VI)	WS	D	19.5		0.010	0.055	µg/L	B221623	S220791
2207261-54	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221623	S220791
2207261-54	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-54	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221623	S220791
2207261-54	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221623	S220791
RG_FO23_WS_LAEMP_LCO_2022-07_N										
2207261-55	Se	WS	D	22.8		0.165	0.528	µg/L	B221657	S220779
RG_FO23_WS_LAEMP_LCO_2022-07_N										
2207261-56	Se	WS	TR	22.1		0.165	0.528	µg/L	B221657	S220779

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FRUL_WS_LAEMP_LCO_2022-07_NP_NAL										
2207261-57	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-57	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-57	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-57	Se(IV)	WS	D	0.100		0.020	0.075	µg/L	B221623	S220791
2207261-57	Se(VI)	WS	D	20.7		0.010	0.055	µg/L	B221623	S220791
2207261-57	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221623	S220791
2207261-57	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-57	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221623	S220791
2207261-57	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221623	S220791
RG_FRUL_WS_LAEMP_LCO_2022-07_N										
2207261-58	Se	WS	D	24.3		0.165	0.528	µg/L	B221657	S220779
RG_FRUL_WS_LAEMP_LCO_2022-07_N										
2207261-59	Se	WS	TR	24.2		0.165	0.528	µg/L	B221657	S220779
RG_LIDCOM_WS_LAEMP_LCO_2022-07_NP_NAL										
2207261-60	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-60	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-60	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-60	Se(IV)	WS	D	0.052	J	0.020	0.075	µg/L	B221623	S220791
2207261-60	Se(VI)	WS	D	21.7		0.010	0.055	µg/L	B221623	S220791
2207261-60	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221623	S220791
2207261-60	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-60	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221623	S220791
2207261-60	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221623	S220791
RG_LIDCOM_WS_LAEMP_LCO_2022-07_N										
2207261-61	Se	WS	D	23.5		0.165	0.528	µg/L	B221657	S220779
RG_LIDCOM_WS_LAEMP_LCO_2022-07_N										
2207261-62	Se	WS	TR	22.6		0.165	0.528	µg/L	B221657	S220779

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP_NAL										
2207261-63	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-63	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-63	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-63	Se(IV)	WS	D	≤ 0.020	U	0.020	0.075	µg/L	B221623	S220791
2207261-63	Se(VI)	WS	D	0.021	J	0.010	0.055	µg/L	B221623	S220791
2207261-63	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B221623	S220791
2207261-63	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B221623	S220791
2207261-63	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B221623	S220791
2207261-63	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B221623	S220791
RG_FBLANK_WS_LAEMP_LCO_2022-07_N										
2207261-64	Se	WS	D	≤ 0.165	U	0.165	0.528	µg/L	B221657	S220779
RG_FBLANK_WS_LAEMP_LCO_2022-07_N										
2207261-65	Se	WS	TR	≤ 0.165	U	0.165	0.528	µg/L	B221657	S220779

Accuracy & Precision Summary

Batch: B221623
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B221623-BS1	**Blank Spike, (2124033)**						
	MeSe(IV)		5.095	5.469	µg/L	107% 75-125	
	Se(IV)		5.000	4.902	µg/L	98% 75-125	
	Se(VI)		5.000	4.762	µg/L	95% 75-125	
	SeCN		5.015	4.616	µg/L	92% 75-125	
	SeMet		4.932	4.937	µg/L	100% 75-125	
B221623-DUP7	**Duplicate, (2207261-51)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	MeSe(VI)	ND		ND	µg/L		N/C 25
	Se(IV)	0.048		0.047	µg/L		0.3% 25
	Se(VI)	20.01		20.18	µg/L		0.8% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B221623-MS7	**Matrix Spike, (2207261-51)**						
	Se(IV)	0.048	4.900	4.660	µg/L	94% 75-125	
	Se(VI)	20.01	5.100	24.92	µg/L	96% 75-125	
	SeCN	ND	1.962	1.692	µg/L	86% 75-125	
	SeMet	ND	1.977	1.897	µg/L	96% 75-125	
B221623-MSD7	**Matrix Spike Duplicate, (2207261-51)**						
	Se(IV)	0.048	4.900	4.636	µg/L	94% 75-125	0.5% 25
	Se(VI)	20.01	5.100	24.97	µg/L	97% 75-125	0.2% 25
	SeCN	ND	1.962	1.653	µg/L	84% 75-125	2% 25
	SeMet	ND	1.977	1.912	µg/L	97% 75-125	0.8% 25

Accuracy & Precision Summary

Batch: B221623
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B221623-DUP6	**Duplicate, (2207351-10)**						
	DMSeO	0.017		0.019	µg/L		11% 25
	MeSe(IV)	0.013		ND	µg/L		N/C 25
	MeSe(VI)	ND		ND	µg/L		N/C 25
	Se(IV)	4.106		3.824	µg/L		7% 25
	Se(VI)	121.3		110.2	µg/L		10% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B221623-MS6	**Matrix Spike, (2207351-10)**						
	Se(IV)	4.106	4.900	8.060	µg/L	81% 75-125	
	Se(VI)	121.3	5.100	116.1	µg/L	NR 75-125	
	SeCN	ND	1.962	1.803	µg/L	92% 75-125	
	SeMet	ND	1.977	1.961	µg/L	99% 75-125	
B221623-MSD6	**Matrix Spike Duplicate, (2207351-10)**						
	Se(IV)	4.106	4.900	8.030	µg/L	80% 75-125	0.4% 25
	Se(VI)	121.3	5.100	115.2	µg/L	NR 75-125	N/C 25
	SeCN	ND	1.962	1.777	µg/L	91% 75-125	1% 25
	SeMet	ND	1.977	1.970	µg/L	100% 75-125	0.4% 25

Accuracy & Precision Summary

Batch: B221657
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B221657-BS1	**Blank Spike, (2137005)**						
	Se		200.0	177.6	µg/L	89% 75-125	
B221657-BS2	**Blank Spike, (2137005)**						
	Se		200.0	193.5	µg/L	97% 75-125	
B221657-BS3	**Blank Spike, (2137005)**						
	Se		200.0	205.0	µg/L	102% 75-125	
B221657-SRM1	**Reference Material (2214018, TMDA 51.5 Reference Standard - Bottle 10 - SRM)**						
	Se		14.30	13.02	µg/L	91% 75-125	
B221657-SRM2	**Reference Material (2214018, TMDA 51.5 Reference Standard - Bottle 10 - SRM)**						
	Se		14.30	12.82	µg/L	90% 75-125	
B221657-SRM3	**Reference Material (2214018, TMDA 51.5 Reference Standard - Bottle 10 - SRM)**						
	Se		14.30	12.61	µg/L	88% 75-125	
B221657-DUP3	**Duplicate, (2207259-05)**						
	Se	51.98		52.68	µg/L		1% 20
B221657-MS3	**Matrix Spike, (2207259-05)**						
	Se	51.98	220.0	264.1	µg/L	96% 75-125	
B221657-MSD3	**Matrix Spike Duplicate, (2207259-05)**						
	Se	51.98	220.0	268.0	µg/L	98% 75-125	1% 20
B221657-DUP4	**Duplicate, (2207261-35)**						
	Se	35.75		34.69	µg/L		3% 20
B221657-MS4	**Matrix Spike, (2207261-35)**						
	Se	35.75	220.0	239.4	µg/L	93% 75-125	

Accuracy & Precision Summary

Batch: B221657
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B221657-MSD4	**Matrix Spike Duplicate, (2207261-35)**						
	Se	35.75	220.0	245.3	µg/L	95% 75-125	2% 20
B221657-DUP5	**Duplicate, (2207261-53)**						
	Se	20.61		20.38	µg/L		1% 20
B221657-MS5	**Matrix Spike, (2207261-53)**						
	Se	20.61	220.0	234.6	µg/L	97% 75-125	
B221657-MSD5	**Matrix Spike Duplicate, (2207261-53)**						
	Se	20.61	220.0	237.9	µg/L	99% 75-125	1% 20

Method Blanks & Reporting Limits

Batch: B221623
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B221623-BLK1	0.00	µg/L
B221623-BLK2	0.00	µg/L
B221623-BLK3	0.00	µg/L
B221623-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B221623-BLK1	0.00	µg/L
B221623-BLK2	0.00	µg/L
B221623-BLK3	0.00	µg/L
B221623-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B221623-BLK1	0.00	µg/L
B221623-BLK2	0.00	µg/L
B221623-BLK3	0.00	µg/L
B221623-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B221623-BLK1	0.0006	µg/L
B221623-BLK2	0.00	µg/L
B221623-BLK3	0.00	µg/L
B221623-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.004
MRL: 0.015

Analyte: Se(VI)

Sample	Result	Units
B221623-BLK1	0.00	µg/L
B221623-BLK2	0.00	µg/L
B221623-BLK3	0.00	µg/L
B221623-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: SeCN

Sample	Result	Units
B221623-BLK1	0.00	µg/L
B221623-BLK2	0.00	µg/L
B221623-BLK3	0.00	µg/L
B221623-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.010

MDL: 0.002
MRL: 0.010

Analyte: SeMet

Sample	Result	Units
B221623-BLK1	0.00	µg/L
B221623-BLK2	0.00	µg/L
B221623-BLK3	0.00	µg/L
B221623-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B221623-BLK1	0.00	µg/L
B221623-BLK2	0.00	µg/L
B221623-BLK3	0.00	µg/L
B221623-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B221623-BLK1	0.00	µg/L
B221623-BLK2	0.00	µg/L
B221623-BLK3	0.00	µg/L
B221623-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Method Blanks & Reporting Limits

Batch: B221657
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B221657-BLK1	-0.069	µg/L
B221657-BLK2	-0.006	µg/L
B221657-BLK3	-0.029	µg/L
B221657-BLK4	-0.033	µg/L

Average: -0.034
Limit: 0.480

MDL: 0.150
MRL: 0.480

Sample Containers

Lab ID: 2207261-33
Sample: RG_RIVER_WS_LAEMP_LCO_2022-07_NP_NAL

Report Matrix: WS
Sample Type: Sample + Sum

Collected: 07/12/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 2 - 2207261
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 2 - 2207261
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 2 - 2207261

Sample Containers

Lab ID: 2207261-34 **Report Matrix:** WS **Collected:** 07/12/2022
Sample: RG_RIVER_WS_LAEMP_LCO_2022-07_N **Sample Type:** Sample + Sum **Received:** 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-35 **Report Matrix:** WS **Collected:** 07/12/2022
Sample: RG_RIVER_WS_LAEMP_LCO_2022-07_N **Sample Type:** Sample + Sum **Received:** 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-36 **Report Matrix:** WS **Collected:** 07/12/2022
Sample: RG_SLINE_WS_LAEMP_LCO_2022-07_NP_NAL **Sample Type:** Sample + Sum **Received:** 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 2 - 2207261
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 2 - 2207261
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 2 - 2207261

Lab ID: 2207261-37 **Report Matrix:** WS **Collected:** 07/12/2022
Sample: RG_SLINE_WS_LAEMP_LCO_2022-07_N **Sample Type:** Sample + Sum **Received:** 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-38 **Report Matrix:** WS **Collected:** 07/12/2022
Sample: RG_SLINE_WS_LAEMP_LCO_2022-07_N **Sample Type:** Sample + Sum **Received:** 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Sample Containers

Lab ID: 2207261-39
Sample: RG_LI24_WS_LAEMP_LCO_2022_07_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/11/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 2 - 2207261
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 2 - 2207261
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 2 - 2207261

Lab ID: 2207261-40
Sample: RG_LI24_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/11/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-41
Sample: RG_LI24_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/11/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-42
Sample: RG_LISP24_WS_LAEMP_LCO_2022-07_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/13/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 2 - 2207261
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 2 - 2207261
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 2 - 2207261

Sample Containers

Lab ID: 2207261-43
Sample: RG_LISP24_WS_LAEMP_LCO_2022-07_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/13/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-44
Sample: RG_LISP24_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/13/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-45
Sample: RG_LILC3_WS_LAEMP_LCO_2022-07_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/12/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 2 - 2207261
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 2 - 2207261
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 2 - 2207261

Lab ID: 2207261-46
Sample: RG_LILC3_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/12/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-47
Sample: RG_LILC3_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/12/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Sample Containers

Lab ID: 2207261-48
Sample: RG_LCUT_WS_LAEMP_LCO_2022-07_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/12/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 2 - 2207261
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 2 - 2207261
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 2 - 2207261

Lab ID: 2207261-49
Sample: RG_LCUT_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/12/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-50
Sample: RG_LCUT_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/12/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-51
Sample: RG_LI8_WS_LAEMP_LCO_2022-07_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/14/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 2 - 2207261
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 2 - 2207261
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 2 - 2207261

Sample Containers

Lab ID: 2207261-52 **Report Matrix:** WS **Collected:** 07/14/2022
Sample: RG_LI8_WS_LAEMP_LCO_2022-07_N **Sample Type:** Sample + Sum **Received:** 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-53 **Report Matrix:** WS **Collected:** 07/14/2022
Sample: RG_LI8_WS_LAEMP_LCO_2022-07_N **Sample Type:** Sample + Sum **Received:** 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-54 **Report Matrix:** WS **Collected:** 07/11/2022
Sample: RG_FO23_WS_LAEMP_LCO_2022-07_NP_NAL **Sample Type:** Sample + Sum **Received:** 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 2 - 2207261
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 2 - 2207261
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 2 - 2207261

Lab ID: 2207261-55 **Report Matrix:** WS **Collected:** 07/11/2022
Sample: RG_FO23_WS_LAEMP_LCO_2022-07_N **Sample Type:** Sample + Sum **Received:** 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-56 **Report Matrix:** WS **Collected:** 07/11/2022
Sample: RG_FO23_WS_LAEMP_LCO_2022-07_N **Sample Type:** Sample + Sum **Received:** 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Sample Containers

Lab ID: 2207261-57
Sample: RG_FRUL_WS_LAEMP_LCO_2022-07_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/13/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 2 - 2207261
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 2 - 2207261
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 2 - 2207261

Lab ID: 2207261-58
Sample: RG_FRUL_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/13/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-59
Sample: RG_FRUL_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/13/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-60
Sample: RG_LIDCOM_WS_LAEMP_LCO_2022-07_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/14/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 2 - 2207261
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 2 - 2207261
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 2 - 2207261

Sample Containers

Lab ID: 2207261-61
Sample: RG_LIDCOM_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/14/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-62
Sample: RG_LIDCOM_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/14/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-63
Sample: RG_FBLANK_WS_LAEMP_LCO_2022-07_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/11/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 2 - 2207261
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 2 - 2207261
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 2 - 2207261

Lab ID: 2207261-64
Sample: RG_FBLANK_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/11/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Lab ID: 2207261-65
Sample: RG_FBLANK_WS_LAEMP_LCO_2022-07_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 07/11/2022
Received: 07/21/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2218038	<2	Cooler 2 - 2207261

Shipping Containers

Cooler 2 - 2207261

Received: July 21, 2022 7:41
Tracking No: PAPS#RWHV94532 via Courier
Coolant Type: Ice
Temperature: 2.5 °C

Description: Cooler 2
Damaged in transit? No
Returned to client? No
Comments: IR #33

Custody seals present? No
Custody seals intact? No
COC present? Yes

COC ID:	REP_LAEMP_LCO_2022_JULY_BROOKS	TURNAROUND TIME:	Regular	RUSH	N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	Brooks Applied Labs			Report Format / Distribution	Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Ben Wozniak			Email 1: aquascilab@teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Ben@brooksapplied.com			Email 2: teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	13751 Lake City Way NE			Email 3: Teck.Lab.Results@teck.com	X	X	X
					Suite 108			Email 4: Jessica.Ritz@Teck.com	X	X	X
City	Sparwood	Province	BC	City	Seattle	Province	WA	Email 5: Tyler.Mehler@Minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	98125	Country	United S	Email 6: lbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	(206) 753-6158			PO number	VPO00817033		

SAMPLE DETAILS / ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Fil.	F	F											
								PRESERV.	Frozen	HNO3	HNO3											
								ANALYSIS	Brooks_Se_Speciation	Brooks_Se_D	Brooks_Se_T										
RG_FRUL_WS_LAEMP_LCO_2022-07_NP_NAL	RG_FRUL	WS	NO	2022-07-13	09:30	G	1		X												
RG_FRUL_WS_LAEMP_LCO_2022-07_N	RG_FRUL	WS	NO	2022-07-13	09:30	G	2			X	X										
RG_F023_WS_LAEMP_LCO_2022-07_NP_NAL	RG_F023	WS	NO	2022-07-11	15:30	G	1		X												
RG_F023_WS_LAEMP_LCO_2022-07_N	RG_F023	WS	NO	2022-07-11	15:30	G	2			X	X										
RG_SLINE_WS_LAEMP_LCO_2022-07_NP_NAL	RG_SLINE	WS	NO	2022-07-12	14:00	G	1		X												
RG_SLINE_WS_LAEMP_LCO_2022-07_N	RG_SLINE	WS	NO	2022-07-12	14:00	G	2			X	X										
RG_L124_WS_LAEMP_LCO_2022-07_NP_NAL	RG_L124	WS	NO	2022-07-11	11:10	G	1		X												
RG_L124_WS_LAEMP_LCO_2022-07_N	RG_L124	WS	NO	2022-07-11	11:10	G	2			X	X										
RG_FBLANK_WS_LAEMP_LCO_2022-07_NP_NAL	RG_FBLANK	WS	NO	2022-07-11	09:00	G	1		X												
RG_FBLANK_WS_LAEMP_LCO_2022-07_N	RG_FBLANK	WS	NO	2022-07-11	09:00	G	2			X	X										
RG_LCUT_WS_LAEMP_LCO_2022-07_NP_NAL	RG_LCUT	WS	NO	2022-07-12	09:30	G	1		X												
RG_LCUT_WS_LAEMP_LCO_2022-07_N	RG_LCUT	WS	NO	2022-07-12	09:30	G	2			X	X										
		WS	NO			G	2														

	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Rich Smit / Lotic Environmental	2022-07-14 14:30	AG/BAL	7/21/22 7:41

SERVICE REQUEST (rush - subject to availability)

Regular (default)	X
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Rick Smit	Mobile #	403-586-3241
Sampler's Signature		Date/Time	2022-07-14 / 14:30

COC ID: REP_LAEMP_LCO_2022_JULY_BROOKS

TURNAROUND TIME: Regular

RUSH: N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program - LCO LAEMP			Lab Name	Brooks Applied Labs			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Ben Wozniak			Email 1:	aquascilab@teck.com	x	x	x
Email	Cybele.Heddle@Teck.com			Email	Ben@brooksapplied.com			Email 2:	teckcoal@equisonline.com			x
Address	421 Pine Ave			Address	13751 Lake City Way NE			Email 3:	Teck.Lab.Results@teck.com	x	x	x
					Suite 108			Email 4:	Jessica.Ritz@Teck.com	x	x	x
City	Sparwood	Province	BC	City	Seattle	Province	WA	Email 5:	Tyler.Mehler@Minnow.ca	x	x	x
Postal Code	V0B 2G0	Country	Canada	Postal Code	98125	Country	United S	Email 6:	lbowron@minnow.ca	x	x	x
Phone Number	250-910-8755			Phone Number	(206) 753-6158			PO number	VPO00817033			

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIL.	F	F												
								PRESERV.	Frozen	HNO3	HNO3												
								ANALYSIS	Brooks_Se_Speciation	Brooks_Se_D	Brooks_Se_T												
RG_LILC3_WS_LAEMP_LCO_2022-07_NP_NAL	RG_LILC3	WS	NO	2022-07-12	11:45	G	1		X													
RG_LILC3_WS_LAEMP_LCO_2022-07_N	RG_LILC3	WS	NO	2022-07-12	11:45	G	2			X	X											
RG_RIVER_WS_LAEMP_LCO_2022-07_NP_NAL	RG_RIVER	WS	NO	2022-07-12	10:00	G	1		X													
RG_RIVER_WS_LAEMP_LCO_2022-07_N	RG_RIVER	WS	NO	2022-07-12	10:00	G	2			X	X											
RG_LISP24_WS_LAEMP_LCO_2022-07_NP_NAL	RG_LISP24	WS	NO	2022-07-13	12:45	G	1		X													
RG_LISP24_WS_LAEMP_LCO_2022-07_N	RG_LISP24	WS	NO	2022-07-13	12:45	G	2			X	X											
RG_LIDCOM_WS_LAEMP_LCO_2022-07_NP_NAL	RG_LIDCOM	WS	NO	2022-07-14	13:00	G	1		X													
RG_LIDCOM_WS_LAEMP_LCO_2022-07_N	RG_LIDCOM	WS	NO	2022-07-14	13:00	G	2			X	X											
RG_L18_WS_LAEMP_LCO_2022-07_NP_NAL	RG_L18	WS	NO	2022-07-14	09:45	G	1		X													
RG_L18_WS_LAEMP_LCO_2022-07_N	RG_L18	WS	NO	2022-07-14	09:45	G	2			X	X											
		WS	NO			G																
		WS	NO			G																
		WS	NO			G																

	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Rich Smit/Lotic environmental	2022-07-14/ 14:30	ASG/BAL	7/21/22 7:41

SERVICE REQUEST (rush - subject to availability)

Regular (default)	X
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Rick Smit	**Mobile #**	403-586-3241
Sampler's Signature		**Date/Time**	2022-07-14 / 14.30

Confidential

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 94532

Sparwood, BC
Terrace, BC
Red Deer, AB

Vancouver, BC
Calgary, AB
Montreal, QC

Prince George, BC
Edmonton, AB
Spokane, WA

Elkford, BC
Ft. McMurray, AB
Shelby, MT

Tumbler Ridge, BC
Hinton, AB
Gillette, WY

INVOICE TO	DATE July 19-22
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM)	CONSIGNEE (TO)
STREET	STREET
CITY/PROVINCE / POSTAL CODE	CITY/PROVINCE / POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
2	Coolers - Water Samples	74 LBS

PAPS# RWHV94532

FREIGHT CHARGES
SHIPPER TO CHECK
☐ PREPAID ☐ COLLECT
If not indicated, shipping will automatically move collect

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
IF AT OWNER'S RISK, WRITE ORD HERE

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $

DRIVER'S SIGNATURE - PICK UP BY	PICK UP TIME	DRIVER'S SIGNATURE - DELIVERY BY	FINISH TIME

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice, therefor setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, or in the case of failure to make delivery within nine (9) months from the date of shipment. (b) The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of packages unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consigned at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT	CONSIGNEE PRINT Stavya	DATE
SHIPPER SIGN	CONSIGNEE SIGN	TIME

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

GST # 864540398RT0001

NUMBER OF PIECES RECEIVED

AMIGOS PRINTING

Cooler ID: Cooler 2 **COC (Y/N)** **Temperature:** 2.5 **IR:** 13

Coolant Type: (Ice) Blue Ice Ambient

Notes:

Sampling Locations:	WL		RG		GH		EV		LC	
Sample Types:	(T/D)	(SP)	T/D	(SP)	T/D	(SP)	T/D	(SP)	T/D	(SP)
Container Types:	40mL glass	125mL Plastic	40mL glass	125mL ~~glass~~ (1) Plastic		125mL ~~glass~~ (1) Plastic		125mL Plastic		125mL Plastic

Opened By: ERL **Date:** 7/21/22

Effective 7/29/20

(1) EE ERL 7/21/22

COPY

2207261

Revision 004

SELENIUM SPECIATION

BAL Final Report 2209188
(Finalized September 21, 2022)

BROOKS APPLIED LABS
13751 Lake City Way NE, Ste 108, Seattle, WA 98125 • USA • T:206-632-6206 • info@brooksapplied.com

September 21, 2022

Teck Resources Limited – Vancouver
Cybele Heddle
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
cybele.heddle@teck.com

Re: Regional Effects Program

Dear Cybele Heddle,

On September 15, 2022, Brooks Applied Labs (BAL) received six (6) aqueous samples. The samples were logged-in for total recoverable selenium [*Se*], dissolved Se [*Se*], and Se speciation analyses, according to the chain-of-custody (COC) form.

The sample fractions for total recoverable Se and dissolved Se were not preserved in the field. The samples were preserved (pH < 2) upon receipt at BAL. All sample fractions for total recoverable Se and dissolved Se were preserved within the (14 calendar day) preservation holding time.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

Total Recoverable Se and Dissolved Se
Each aqueous sample fraction for dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Selenium Speciation
Each aqueous sample was analyzed for selenium speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [*Se(IV)*], selenate [*Se(VI)*], selenocyanate [*SeCN*], methylseleninic acid [*MeSe(IV)*], methaneselenonic acid [*MeSe(VI)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [*Unk Se Sp*].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional selenium species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting selenium species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (**NR**) and the relative percent difference (RPD) of the MS/MSD set was not calculated (**N/C**).

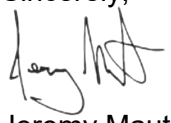
In cases when either the native sample concentration was non-detectable (reported as less than or equal to the MDL) and/or the corresponding DUP result was also non-detectable, the RPD between the two values was not calculated (**N/C**).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,



Jeremy Maute
Senior Project Manager
Brooks Applied Labs
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received
BAL	Brooks Applied Labs
BLK	method blank
BS	blank spike
CAL	calibration standard
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain of custody record
D	dissolved fraction
DUP	duplicate
IBL	instrument blank
ICV	initial calibration verification
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
NR	non-reportable
N/C	not calculated
PS	post preparation spike
REC	percent recovery
RPD	relative percent difference
SCV	secondary calibration verification
SOP	standard operating procedure
SRM	reference material
T	total fraction
TR	total recoverable fraction

Definition of Data Qualifiers

(Effective 3/23/2020)

E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.

H Holding time and/or preservation requirements not met. Please see narrative for explanation.

J Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.

J-1 Estimated value. A full explanation is presented in the narrative.

M Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.

N Spike recovery was not within acceptance criteria. Please see narrative for explanation.

R Rejected, unusable value. A full explanation is presented in the narrative.

U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.

X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.

Z Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022
Certificate Number: E87982-37

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod	Non-Potable Waters	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn
BAL-5000	Solids/Chemicals & Biological	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn Hg (Biological Only)
EPA 1640 Mod	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn Ag, As, Cr, Co, Se, Tl, V (ISO Only)
EPA 1631E Mod BAL-3100	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury
EPA 1632A Mod BAL-3300	Non-Potable Waters	Inorganic Arsenic (ISO Only)
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)
AOAC 2015.01 Mod BAL-5000	Food	As, Cd, Hg, Pb
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
	Biological by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)
BAL-4101	Food by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II) (ISO Only)
SM2340B	Non-Potable Waters	Hardness
SM 2540G BAL-0501	Solids/Chemicals & Biological	% Dry Weight

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FO23_WS_LAEMP_LCO_2022-09_N	2209188-01	WS	Sample	09/09/2022	09/15/2022
RG_FO23_WS_LAEMP_LCO_2022-09_NP-NAL	2209188-02	WS	Sample	09/09/2022	09/15/2022
RG_FO23_WS_LAEMP_LCO_2022-09_NP-NAL	2209188-03	WS	Sample	09/09/2022	09/15/2022
RG_FRUL_WS_LAEMP_LCO_2022-09_N	2209188-04	WS	Sample	09/10/2022	09/15/2022
RG_FRUL_WS_LAEMP_LCO_2022-09_NP-NAL	2209188-05	WS	Sample	09/10/2022	09/15/2022
RG_FRUL_WS_LAEMP_LCO_2022-09_NP-NAL	2209188-06	WS	Sample	09/10/2022	09/15/2022
RG_LILC3_WS_LAEMP_LCO_2022-09_N	2209188-07	WS	Sample	09/08/2022	09/15/2022
RG_LILC3_WS_LAEMP_LCO_2022-09_NP-NAL	2209188-08	WS	Sample	09/08/2022	09/15/2022
RG_LILC3_WS_LAEMP_LCO_2022-09_NP-NAL	2209188-09	WS	Sample	09/08/2022	09/15/2022

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	09/14/2022	09/16/2022	B222056	S220953
MeSe(IV)	Water	SOP BAL-4201	09/14/2022	09/16/2022	B222056	S220953
MeSe(VI)	Water	SOP BAL-4201	09/14/2022	09/16/2022	B222056	S220953
Se	Water	EPA 1638 Mod	09/16/2022	09/20/2022	B222134	S220972
Se(IV)	Water	SOP BAL-4201	09/14/2022	09/16/2022	B222056	S220953
Se(VI)	Water	SOP BAL-4201	09/14/2022	09/16/2022	B222056	S220953
SeCN	Water	SOP BAL-4201	09/14/2022	09/16/2022	B222056	S220953
SeMet	Water	SOP BAL-4201	09/14/2022	09/16/2022	B222056	S220953
SeSO3	Water	SOP BAL-4201	09/14/2022	09/16/2022	B222056	S220953
Unk Se Sp	Water	SOP BAL-4201	09/14/2022	09/16/2022	B222056	S220953

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FO23_WS_LAEMP_LCO_2022-09_N										
2209188-01	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222056	S220953
2209188-01	MeSe(IV)	WS	D	0.011	J	0.010	0.025	µg/L	B222056	S220953
2209188-01	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222056	S220953
2209188-01	Se(IV)	WS	D	0.197		0.020	0.075	µg/L	B222056	S220953
2209188-01	Se(VI)	WS	D	36.5		0.010	0.055	µg/L	B222056	S220953
2209188-01	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B222056	S220953
2209188-01	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222056	S220953
2209188-01	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222056	S220953
2209188-01	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B222056	S220953
RG_FO23_WS_LAEMP_LCO_2022-09_NP-NAL										
2209188-02	Se	WS	D	32.2		0.165	0.528	µg/L	B222134	S220972
RG_FO23_WS_LAEMP_LCO_2022-09_NP-NAL										
2209188-03	Se	WS	TR	35.6		0.165	0.528	µg/L	B222134	S220972
RG_FRUL_WS_LAEMP_LCO_2022-09_N										
2209188-04	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222056	S220953
2209188-04	MeSe(IV)	WS	D	0.014	J	0.010	0.025	µg/L	B222056	S220953
2209188-04	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222056	S220953
2209188-04	Se(IV)	WS	D	0.248		0.020	0.075	µg/L	B222056	S220953
2209188-04	Se(VI)	WS	D	40.1		0.010	0.055	µg/L	B222056	S220953
2209188-04	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B222056	S220953
2209188-04	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222056	S220953
2209188-04	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222056	S220953
2209188-04	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B222056	S220953
RG_FRUL_WS_LAEMP_LCO_2022-09_NP-NAL										
2209188-05	Se	WS	D	36.5		0.165	0.528	µg/L	B222134	S220972
RG_FRUL_WS_LAEMP_LCO_2022-09_NP-NAL										
2209188-06	Se	WS	TR	38.2		0.165	0.528	µg/L	B222134	S220972

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LILC3_WS_LAEMP_LCO_2022-09_N										
2209188-07	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222056	S220953
2209188-07	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222056	S220953
2209188-07	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222056	S220953
2209188-07	Se(IV)	WS	D	0.122		0.020	0.075	µg/L	B222056	S220953
2209188-07	Se(VI)	WS	D	43.4		0.010	0.055	µg/L	B222056	S220953
2209188-07	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B222056	S220953
2209188-07	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222056	S220953
2209188-07	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222056	S220953
2209188-07	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B222056	S220953
RG_LILC3_WS_LAEMP_LCO_2022-09_NP-NAL										
2209188-08	Se	WS	D	39.5		0.165	0.528	µg/L	B222134	S220972
RG_LILC3_WS_LAEMP_LCO_2022-09_NP-NAL										
2209188-09	Se	WS	TR	39.3		0.165	0.528	µg/L	B222134	S220972

Accuracy & Precision Summary

Batch: B222056
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B222056-BS1	**Blank Spike, (2124033)**						
	MeSe(IV)		5.095	5.504	µg/L	108% 75-125	
	Se(IV)		5.000	4.917	µg/L	98% 75-125	
	Se(VI)		5.000	4.657	µg/L	93% 75-125	
	SeCN		5.015	4.709	µg/L	94% 75-125	
	SeMet		4.932	4.821	µg/L	98% 75-125	
B222056-DUP6	**Duplicate, (2209188-07)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	MeSe(VI)	ND		ND	µg/L		N/C 25
	Se(IV)	0.122		0.118	µg/L		4% 25
	Se(VI)	43.38		43.03	µg/L		0.8% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B222056-MS6	**Matrix Spike, (2209188-07)**						
	Se(IV)	0.122	4.900	4.574	µg/L	91% 75-125	
	Se(VI)	43.38	5.100	47.43	µg/L	NR 75-125	
	SeCN	ND	1.962	1.758	µg/L	90% 75-125	
	SeMet	ND	1.977	1.811	µg/L	92% 75-125	
B222056-MSD6	**Matrix Spike Duplicate, (2209188-07)**						
	Se(IV)	0.122	4.900	4.537	µg/L	90% 75-125	0.8% 25
	Se(VI)	43.38	5.100	46.76	µg/L	NR 75-125	N/C 25
	SeCN	ND	1.962	1.735	µg/L	88% 75-125	1% 25
	SeMet	ND	1.977	1.821	µg/L	92% 75-125	0.5% 25

Accuracy & Precision Summary

Batch: B222134
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B222134-BS1	**Blank Spike, (2128023)**						
	Se		200.0	163.3	µg/L	82% 75-125	
B222134-BS2	**Blank Spike, (2128023)**						
	Se		200.0	159.2	µg/L	80% 75-125	
B222134-BS3	**Blank Spike, (2128023)**						
	Se		200.0	160.1	µg/L	80% 75-125	
B222134-SRM1	**Reference Material (2214014, TMDA 51.5 Reference Standard - Bottle 6 - SRM)**						
	Se		14.30	11.78	µg/L	82% 75-125	
B222134-SRM2	**Reference Material (2214014, TMDA 51.5 Reference Standard - Bottle 6 - SRM)**						
	Se		14.30	12.50	µg/L	87% 75-125	
B222134-SRM3	**Reference Material (2214014, TMDA 51.5 Reference Standard - Bottle 6 - SRM)**						
	Se		14.30	11.52	µg/L	81% 75-125	
B222134-DUP2	**Duplicate, (2209182-14)**						
	Se	85.48		84.60	µg/L		1% 20
B222134-MS2	**Matrix Spike, (2209182-14)**						
	Se	85.48	220.0	277.7	µg/L	87% 75-125	
B222134-MSD2	**Matrix Spike Duplicate, (2209182-14)**						
	Se	85.48	220.0	267.1	µg/L	83% 75-125	4% 20
B222134-DUP4	**Duplicate, (2209188-02)**						
	Se	32.17		32.24	µg/L		0.2% 20
B222134-MS4	**Matrix Spike, (2209188-02)**						
	Se	32.17	220.0	223.3	µg/L	87% 75-125	

Accuracy & Precision Summary

Batch: B222134
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B222134-MSD4	**Matrix Spike Duplicate, (2209188-02)**						
	Se	32.17	220.0	223.2	µg/L	87% 75-125	0.06% 20

Method Blanks & Reporting Limits

Batch: B222056
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B222056-BLK1	0.00	µg/L
B222056-BLK2	0.00	µg/L
B222056-BLK3	0.00	µg/L
B222056-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B222056-BLK1	0.00	µg/L
B222056-BLK2	0.00	µg/L
B222056-BLK3	0.00	µg/L
B222056-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B222056-BLK1	0.00	µg/L
B222056-BLK2	0.00	µg/L
B222056-BLK3	0.00	µg/L
B222056-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B222056-BLK1	0.00	µg/L
B222056-BLK2	0.00	µg/L
B222056-BLK3	0.00	µg/L
B222056-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.004
MRL: 0.015

Analyte: Se(VI)

Sample	Result	Units
B222056-BLK1	0.00	µg/L
B222056-BLK2	0.00	µg/L
B222056-BLK3	0.00	µg/L
B222056-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: SeCN

Sample	Result	Units
B222056-BLK1	0.00	µg/L
B222056-BLK2	0.00	µg/L
B222056-BLK3	0.00	µg/L
B222056-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.010

MDL: 0.002
MRL: 0.010

Analyte: SeMet

Sample	Result	Units
B222056-BLK1	0.00	µg/L
B222056-BLK2	0.00	µg/L
B222056-BLK3	0.00	µg/L
B222056-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B222056-BLK1	0.00	µg/L
B222056-BLK2	0.00	µg/L
B222056-BLK3	0.00	µg/L
B222056-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B222056-BLK1	0.00	µg/L
B222056-BLK2	0.00	µg/L
B222056-BLK3	0.00	µg/L
B222056-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Method Blanks & Reporting Limits

Batch: B222134
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B222134-BLK1	0.023	µg/L
B222134-BLK2	0.073	µg/L
B222134-BLK3	0.041	µg/L
B222134-BLK4	-0.013	µg/L

Average: 0.031
Limit: 0.480

MDL: 0.150
MRL: 0.480

Sample Containers

Lab ID: 2209188-01 **Report Matrix:** WS **Collected:** 09/09/2022
Sample: RG_FO23_WS_LAEMP_LCO_2022-09_N **Sample Type:** Sample + Sum **Received:** 09/15/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2209188
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2209188
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 4 - 2209188

Lab ID: 2209188-02 **Report Matrix:** WS **Collected:** 09/09/2022
Sample: RG_FO23_WS_LAEMP_LCO_2022-09_NP-NAL **Sample Type:** Sample + Sum **Received:** 09/15/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 2 - 2209188

Lab ID: 2209188-03 **Report Matrix:** WS **Collected:** 09/09/2022
Sample: RG_FO23_WS_LAEMP_LCO_2022-09_NP-NAL **Sample Type:** Sample + Sum **Received:** 09/15/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 2 - 2209188

Lab ID: 2209188-04 **Report Matrix:** WS **Collected:** 09/10/2022
Sample: RG_FRUL_WS_LAEMP_LCO_2022-09_N **Sample Type:** Sample + Sum **Received:** 09/15/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2209188
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2209188
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 4 - 2209188

Sample Containers

Lab ID: 2209188-05
Sample: RG_FRUL_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2022
Received: 09/15/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 2 - 2209188

Lab ID: 2209188-06
Sample: RG_FRUL_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2022
Received: 09/15/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 2 - 2209188

Lab ID: 2209188-07
Sample: RG_LILC3_WS_LAEMP_LCO_2022-09_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/08/2022
Received: 09/15/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2209188
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2209188
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 4 - 2209188

Lab ID: 2209188-08
Sample: RG_LILC3_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/08/2022
Received: 09/15/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 2 - 2209188

Lab ID: 2209188-09
Sample: RG_LILC3_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/08/2022
Received: 09/15/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 2 - 2209188

Shipping Containers

Cooler 2 - 2209188

Received: September 15, 2022 7:10
Tracking No: RWHV95580 via Courier
Coolant Type: Ice
Temperature: 5.3 °C

Description: Styrofoam Cooler
Damaged in transit? No
Returned to client? No
Comments: IR#:1

Custody seals present? No
Custody seals intact? No
COC present? Yes

Cooler 4 - 2209188

Received: September 15, 2022 7:10
Tracking No: RWHV95580 via Courier
Coolant Type: Ice
Temperature: 2.4 °C

Description: Styrofoam Cooler
Damaged in transit? No
Returned to client? No
Comments: IR#:2

Custody seals present? No
Custody seals intact? No
COC present? Yes

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BAL Final Report 2209188

COC ID: REP_LAEMP_LCO_2022-09_BROOKS

TURNAROUND TIME: Rush

RUSH: Priority

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name / Job#	Regional Effects Program			Lab Name	Brooks Applied Labs			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Ben Wozniak			Email 1:	AquaSciLab@Teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Ben@brooksapplied.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Avenue			Address	13751 Lake City Way			Email 3:	Teck.Lab.Results@teck.com	X	X	X
					Suite 108			Email 4:	Lisa.Bowron@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Seattle	Province	WA	Email 5:	Tyler.Mehler@Teck.com	X	X	X
Postal Code	V0B 2G1	Country	Canada	Postal Code	98125	Country	United S	Email 6:	Hannah.Penner@Teck.com	X	X	X
Phone Number	1-250-865-3048			Phone Number	(206) 753-6158			PO number	VPO00817033			

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIL	PRESERV.	ANALYSIS: Brooks_Se_Speciation	Brooks_Se_D	Brooks_Se_T
								F	N	N		
RG_FO23_WS_LAEMP_LCO_2022-09_N	RG_FO23	WS		2022/09/09	8:05	G	1			1		
RG_FO23_WS_LAEMP_LCO_2022-09_NP-NAL	RG_FO23	WS		2022/09/09	8:05	G	2				1	1
RG_FRUL_WS_LAEMP_LCO_2022-09_N	RG_FRUL	WS		2022/09/10	8:45	G	1			1		
RG_FRUL_WS_LAEMP_LCO_2022-09_NP-NAL	RG_FRUL	WS		2022/09/10	8:45	G	2				1	1
RG_LILC3_WS_LAEMP_LCO_2022-09_N	RG_LILC3	WS		2022/09/08	9:30	G	1			1		
RG_LILC3_WS_LAEMP_LCO_2022-09_NP-NAL	RG_LILC3	WS		2022/09/08	9:30	G	2				1	1

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Jennifer Ings/Minnow	##########	VNW / BAL	9/15/22 7:10

SERVICE REQUEST (rush - subject to availability)

Regular (default)	
Priority (2-3 business days) - 50% surcharge	X
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	**Jennifer Ings**	**Mobile #**	**519-500-3444**
Sampler's Signature		**Date/Time**	**September 12, 2022**

NOT NEGOTIABLE

250-425-7447

24 Hour Hot Shot Service

No. 95580

Confidential

BAL Final Report 2209188

Sparwood, BC
Terrace, BC
Red Deer, AB

Vancouver, BC
Calgary, AB
Montreal, QC

Prince George, BC
Edmonton, AB
Spokane, WA

Elkford, BC
Ft. McMurray, AB
Shelby, MT

Tumbler Ridge, BC
Hinton, AB
Gillette, WY

INVOICE TO	DATE
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM)	CONSIGNEE (TO)
STREET	STREET
CITY/PROVINCE / POSTAL CODE	CITY/PROVINCE / POSTAL CODE
SPECIAL INSTRUCTIONS	

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
3		
	RWHV95580	

FREIGHT CHARGES
SHIPPER TO CHECK
☐PREPAID ☐COLLECT
If not indicated, shipping will automatically move collect

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
IF AT OWNER'S RISK, WRITE ORD HERE

UNIT #	DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise $
DRIVER'S SIGNATURE - PICK UP BY / PICK UP TIME	DRIVER'S SIGNATURE - DELIVERY BY / FINISH TIME

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice, therefor setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, on the case of failure to make delivery within nine (9) months from the date of shipment (b)The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below which the carrier agrees to carry and to deliver to the consigned at the said destination subject to the rates and classification in effect on the date of shipment. It is mutually agreed as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. Printed or written including conditions set aside by the standard Bill of Lading in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns.
The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment, and is subject to the conditions set out in such conditions

SHIPPER PRINT	CONSIGNEE PRINT	DATE
SHIPPER SIGN	CONSIGNEE SIGN	TIME

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

GST # 864540398RT0001

NUMBER OF PIECES RECEIVED

AMIGOS PRINTING

Cooler ID: Cooler 2 **COC** (Y/N) **Temperature:** 5.3 **IR:** 1

Coolant Type: (Ice) Blue Ice Ambient

Notes:

Sampling Locations:	EV		LC		RG						
Sample Types:	(T/D)	(SP)	(T/D)	SP	(T/D)	SP	T/D	SP	T/D	SP	
Container Types:	125mL glass	125mL Plastic	125mL Plastic		125mL glass						

Opened By: ERL **Date:** 4/15/22

Effective 7/29/20

COPY

2209188

ion 004

NOT NEGOTIABLE

250-425-7447

24 Hour Hot Shot Service

NO. 95580

Confidential

BAL Final Report 2209188

Sparwood, BC
Terrace, BC
Red Deer, AB

Vancouver, BC
Calgary, AB
Montreal, QC

Prince George, BC
Edmonton, AB
Spokane, WA

Elkford, BC
Ft. McMurray, AB
Shelby, MT

Tumbler Ridge, BC
Hinton, AB
Gillette, WY

INVOICE TO | DATE

BILL OF LADING # | PURCHASE ORDER NUMBER

SHIPPER (FROM) | CONSIGNEE (TO)

STREET | STREET

CITY/PROVINCE | POSTAL CODE | CITY/PROVINCE | POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
3	RWHV95580	

FREIGHT CHARGES
SHIPPER TO CHECK
☐PREPAID ☐COLLECT
If not indicated shipping will automatically move collect

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
IF AT OWNER'S RISK WRITE ORD HERE

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $

DRIVER'S SIGNATURE - PICK UP BY | PICK UP TIME | DRIVER'S SIGNATURE - DELIVERY BY | FINISH TIME

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice, therefor setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, or in the case of failure to make delivery within nine (9) months from the date of shipment (b)The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consigned at the said destination, subject to the rates and classification in effect on the date of shipment It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written including conditions set aside by the standard Bill of Lading in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions

SHIPPER PRINT | CONSIGNEE PRINT

SHIPPER SIGN | CONSIGNEE SIGN

DATE

TIME

NUMBER OF PIECES RECEIVED

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

GST # 864540398RT0001

ARGOS PRINTING

Cooler ID: Cooler 4 **COC** (Y/N) **Temperature:** 2.4°C **IR:** 2

Coolant Type: (Ice) Blue Ice Ambient

Notes:

	WL		EV		LC		RG			
Sampling Locations:										
	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Sample Types:	40 mL Glass	125mL Plastic		60 mL Plastic 60 mL Plastic		125mL Plastic 60mL Plastic		60mL Plastic		
Container Types:										

Opened By: AM **Date:** 9/15/22

125mL Plastic

COPY

Effective 7/29/20

Revision 004

SELENIUM SPECIATION

BAL Final Report 2209288
(Finalized September 28, 2022)

BROOKS APPLIED LABS
13751 Lake City Way NE, Ste 108, Seattle, WA 98125 • USA • T:206-632-6206 • info@brooksapplied.com

September 28, 2022

Teck Resources Limited – Vancouver
Cybele Heddle
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
cybele.heddle@teck.com

Re: Regional Effects Program

Dear Cybele Heddle,

On September 22, 2022, Brooks Applied Labs (BAL) received sixteen (16) aqueous samples. The samples were logged-in for total recoverable selenium [*Se*], dissolved Se [*Se*], and Se speciation analyses, according to the chain-of-custody (COC) form.

The sample fractions for total recoverable Se and dissolved Se were not preserved in the field. The samples were preserved (pH < 2) upon receipt at BAL. All sample fractions for total recoverable Se and dissolved Se were preserved within the (14 calendar day) preservation holding time.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

Total Recoverable Se and Dissolved Se
Each aqueous sample fraction for dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Selenium Speciation
Each aqueous sample was analyzed for selenium speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [*Se(IV)*], selenate [*Se(VI)*], selenocyanate [*SeCN*], methylseleninic acid [*MeSe(IV)*], methaneselenonic acid [*MeSe(VI)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [*Unk Se Sp*].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional selenium species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting selenium species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (**NR**) and the relative percent difference (RPD) of the MS/MSD set was not calculated (**N/C**).

In cases when either the native sample concentration was non-detectable (reported as less than or equal to the MDL) and/or the corresponding DUP result was also non-detectable, the RPD between the two values was not calculated (**N/C**).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute
Senior Project Manager
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received
BAL	Brooks Applied Labs
BLK	method blank
BS	blank spike
CAL	calibration standard
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain of custody record
D	dissolved fraction
DUP	duplicate
IBL	instrument blank
ICV	initial calibration verification
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
NR	non-reportable
N/C	not calculated
PS	post preparation spike
REC	percent recovery
RPD	relative percent difference
SCV	secondary calibration verification
SOP	standard operating procedure
SRM	reference material
T	total fraction
TR	total recoverable fraction

Definition of Data Qualifiers

(Effective 3/23/2020)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022
Certificate Number: E87982-37

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod	Non-Potable Waters	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn
BAL-5000	Solids/Chemicals & Biological	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn Hg (Biological Only)
EPA 1640 Mod	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn Ag, As, Cr, Co, Se, Tl, V (ISO Only)
EPA 1631E Mod BAL-3100	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury
EPA 1632A Mod BAL-3300	Non-Potable Waters	Inorganic Arsenic (ISO Only)
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)
AOAC 2015.01 Mod BAL-5000	Food	As, Cd, Hg, Pb
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
	Biological by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)
BAL-4101	Food by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II) (ISO Only)
SM2340B	Non-Potable Waters	Hardness
SM 2540G BAL-0501	Solids/Chemicals & Biological	% Dry Weight

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	2209288-01	WS	Sample	09/12/2022	09/22/2022
RG_LIDCOM_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-02	WS	Sample	09/12/2022	09/22/2022
RG_LIDCOM_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-03	WS	Sample	09/12/2022	09/22/2022
RG_LISP24_WS_LAEMP_LCO_2022-09_N	2209288-04	WS	Sample	09/14/2022	09/22/2022
RG_LISP24_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-05	WS	Sample	09/14/2022	09/22/2022
RG_LISP24_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-06	WS	Sample	09/14/2022	09/22/2022
RG_LCUT_WS_LAEMP_LCO_2022-09_N	2209288-07	WS	Sample	09/15/2022	09/22/2022
RG_LCUT_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-08	WS	Sample	09/15/2022	09/22/2022
RG_LCUT_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-09	WS	Sample	09/15/2022	09/22/2022
RG_SLINE_WS_LAEMP_LCO_2022-09_N	2209288-10	WS	Sample	09/16/2022	09/22/2022
RG_SLINE_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-11	WS	Sample	09/16/2022	09/22/2022
RG_SLINE_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-12	WS	Sample	09/16/2022	09/22/2022
RG_LI24_WS_LAEMP_LCO_2022-09_N	2209288-13	WS	Sample	09/17/2022	09/22/2022
RG_LI24_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-14	WS	Sample	09/17/2022	09/22/2022
RG_LI24_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-15	WS	Sample	09/17/2022	09/22/2022
RG_LI8_WS_LAEMP_LCO_2022-09_N	2209288-16	WS	Sample	09/17/2022	09/22/2022
RG_LI8_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-17	WS	Sample	09/17/2022	09/22/2022
RG_LI8_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-18	WS	Sample	09/17/2022	09/22/2022
RG_RIVER_WS_LAEMP_LCO_2022-09_NP	2209288-19	WS	Sample	09/15/2022	09/22/2022
RG_RIVER_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-20	WS	Sample	09/15/2022	09/22/2022
RG_RIVER_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-21	WS	Sample	09/15/2022	09/22/2022

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FBLANK_WS_LAEMP_LCO_2022-09_NP	2209288-22	WS	Sample	09/15/2022	09/22/2022
RG_FBLANK_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-23	WS	Sample	09/15/2022	09/22/2022
RG_FBLANK_WS_LAEMP_LCO_2022-09_NP-NAL	2209288-24	WS	Sample	09/15/2022	09/22/2022

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	09/20/2022	09/23/2022	B222130	S220995
MeSe(IV)	Water	SOP BAL-4201	09/20/2022	09/23/2022	B222130	S220995
MeSe(VI)	Water	SOP BAL-4201	09/20/2022	09/23/2022	B222130	S220995
Se	Water	EPA 1638 Mod	09/26/2022	09/27/2022	B222222	S221004
Se(IV)	Water	SOP BAL-4201	09/20/2022	09/23/2022	B222130	S220995
Se(VI)	Water	SOP BAL-4201	09/20/2022	09/23/2022	B222130	S220995
SeCN	Water	SOP BAL-4201	09/20/2022	09/23/2022	B222130	S220995
SeMet	Water	SOP BAL-4201	09/20/2022	09/23/2022	B222130	S220995
SeSO3	Water	SOP BAL-4201	09/20/2022	09/23/2022	B222130	S220995
Unk Se Sp	Water	SOP BAL-4201	09/20/2022	09/23/2022	B222130	S220995

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N										
2209288-01	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-01	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-01	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-01	Se(IV)	WS	D	0.120		0.020	0.075	µg/L	B222130	S220995
2209288-01	Se(VI)	WS	D	34.4		0.010	0.055	µg/L	B222130	S220995
2209288-01	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B222130	S220995
2209288-01	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-01	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222130	S220995
2209288-01	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B222130	S220995
RG_LIDCOM_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-02	Se	WS	D	31.8		0.165	0.528	µg/L	B222222	S221004
RG_LIDCOM_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-03	Se	WS	TR	35.3		0.165	0.528	µg/L	B222222	S221004
RG_LISP24_WS_LAEMP_LCO_2022-09_N										
2209288-04	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-04	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-04	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-04	Se(IV)	WS	D	0.130		0.020	0.075	µg/L	B222130	S220995
2209288-04	Se(VI)	WS	D	38.4		0.010	0.055	µg/L	B222130	S220995
2209288-04	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B222130	S220995
2209288-04	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-04	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222130	S220995
2209288-04	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B222130	S220995
RG_LISP24_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-05	Se	WS	D	36.4		0.165	0.528	µg/L	B222222	S221004
RG_LISP24_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-06	Se	WS	TR	39.5		0.165	0.528	µg/L	B222222	S221004

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LCUT_WS_LAEMP_LCO_2022-09_N										
2209288-07	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-07	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-07	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-07	Se(IV)	WS	D	0.083		0.020	0.075	µg/L	B222130	S220995
2209288-07	Se(VI)	WS	D	63.0		0.010	0.055	µg/L	B222130	S220995
2209288-07	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B222130	S220995
2209288-07	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-07	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222130	S220995
2209288-07	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B222130	S220995
RG_LCUT_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-08	Se	WS	D	61.2		0.165	0.528	µg/L	B222222	S221004
RG_LCUT_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-09	Se	WS	TR	60.8		0.165	0.528	µg/L	B222222	S221004
RG_SLINE_WS_LAEMP_LCO_2022-09_N										
2209288-10	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-10	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-10	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-10	Se(IV)	WS	D	0.021	J	0.020	0.075	µg/L	B222130	S220995
2209288-10	Se(VI)	WS	D	1.43		0.010	0.055	µg/L	B222130	S220995
2209288-10	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B222130	S220995
2209288-10	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-10	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222130	S220995
2209288-10	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B222130	S220995
RG_SLINE_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-11	Se	WS	D	1.41		0.165	0.528	µg/L	B222222	S221004
RG_SLINE_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-12	Se	WS	TR	1.63		0.165	0.528	µg/L	B222222	S221004

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI24_WS_LAEMP_LCO_2022-09_N										
2209288-13	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-13	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-13	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-13	Se(IV)	WS	D	≤ 0.020	U	0.020	0.075	µg/L	B222130	S220995
2209288-13	Se(VI)	WS	D	2.80		0.010	0.055	µg/L	B222130	S220995
2209288-13	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B222130	S220995
2209288-13	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-13	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222130	S220995
2209288-13	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B222130	S220995
RG_LI24_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-14	Se	WS	D	2.87		0.165	0.528	µg/L	B222222	S221004
RG_LI24_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-15	Se	WS	TR	3.02		0.165	0.528	µg/L	B222222	S221004
RG_LI8_WS_LAEMP_LCO_2022-09_N										
2209288-16	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-16	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-16	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-16	Se(IV)	WS	D	0.087		0.020	0.075	µg/L	B222130	S220995
2209288-16	Se(VI)	WS	D	31.8		0.010	0.055	µg/L	B222130	S220995
2209288-16	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B222130	S220995
2209288-16	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-16	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222130	S220995
2209288-16	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B222130	S220995
RG_LI8_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-17	Se	WS	D	30.6		0.165	0.528	µg/L	B222222	S221004
RG_LI8_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-18	Se	WS	TR	30.3		0.165	0.528	µg/L	B222222	S221004

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_RIVER_WS_LAEMP_LCO_2022-09_NP										
2209288-19	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-19	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-19	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-19	Se(IV)	WS	D	0.077		0.020	0.075	µg/L	B222130	S220995
2209288-19	Se(VI)	WS	D	56.7		0.010	0.055	µg/L	B222130	S220995
2209288-19	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B222130	S220995
2209288-19	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-19	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222130	S220995
2209288-19	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B222130	S220995
RG_RIVER_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-20	Se	WS	D	64.5		0.165	0.528	µg/L	B222222	S221004
RG_RIVER_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-21	Se	WS	TR	61.2		0.165	0.528	µg/L	B222222	S221004
RG_FBLANK_WS_LAEMP_LCO_2022-09_NP										
2209288-22	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-22	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-22	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-22	Se(IV)	WS	D	≤ 0.020	U	0.020	0.075	µg/L	B222130	S220995
2209288-22	Se(VI)	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222130	S220995
2209288-22	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B222130	S220995
2209288-22	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B222130	S220995
2209288-22	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B222130	S220995
2209288-22	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B222130	S220995
RG_FBLANK_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-23	Se	WS	D	≤ 0.165	U	0.165	0.528	µg/L	B222222	S221004
RG_FBLANK_WS_LAEMP_LCO_2022-09_NP-NAL										
2209288-24	Se	WS	TR	≤ 0.165	U	0.165	0.528	µg/L	B222222	S221004

Accuracy & Precision Summary

Batch: B222130
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B222130-BS1	**Blank Spike, (2124033)**						
	MeSe(IV)		5.095	6.159	µg/L	121% 75-125	
	Se(IV)		5.000	5.689	µg/L	114% 75-125	
	Se(VI)		5.000	5.231	µg/L	105% 75-125	
	SeCN		5.015	5.177	µg/L	103% 75-125	
	SeMet		4.932	5.459	µg/L	111% 75-125	
B222130-DUP4	**Duplicate, (2209285-19)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	MeSe(VI)	ND		ND	µg/L		N/C 25
	Se(IV)	ND		ND	µg/L		N/C 25
	Se(VI)	0.156		0.152	µg/L		3% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B222130-MS4	**Matrix Spike, (2209285-19)**						
	Se(IV)	ND	4.900	4.994	µg/L	102% 75-125	
	Se(VI)	0.156	5.100	5.181	µg/L	99% 75-125	
	SeCN	ND	1.962	1.798	µg/L	92% 75-125	
	SeMet	ND	1.977	1.917	µg/L	97% 75-125	
B222130-MSD4	**Matrix Spike Duplicate, (2209285-19)**						
	Se(IV)	ND	4.900	5.055	µg/L	103% 75-125	1% 25
	Se(VI)	0.156	5.100	5.198	µg/L	99% 75-125	0.3% 25
	SeCN	ND	1.962	1.818	µg/L	93% 75-125	1% 25
	SeMet	ND	1.977	1.875	µg/L	95% 75-125	2% 25

Accuracy & Precision Summary

Batch: B222130
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B222130-DUP3	**Duplicate, (2209286-01)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	MeSe(VI)	ND		ND	µg/L		N/C 25
	Se(IV)	0.215		0.235	µg/L		9% 25
	Se(VI)	144.4		147.6	µg/L		2% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B222130-MS3	**Matrix Spike, (2209286-01)**						
	Se(IV)	0.215	4.900	5.010	µg/L	98% 75-125	
	Se(VI)	144.4	5.100	156.6	µg/L	NR 75-125	
	SeCN	ND	1.962	1.876	µg/L	96% 75-125	
	SeMet	ND	1.977	2.046	µg/L	104% 75-125	
B222130-MSD3	**Matrix Spike Duplicate, (2209286-01)**						
	Se(IV)	0.215	4.900	5.056	µg/L	99% 75-125	0.9% 25
	Se(VI)	144.4	5.100	156.1	µg/L	NR 75-125	N/C 25
	SeCN	ND	1.962	1.875	µg/L	96% 75-125	0.06% 25
	SeMet	ND	1.977	1.986	µg/L	100% 75-125	3% 25

Accuracy & Precision Summary

Batch: B222222
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B222222-BS1	**Blank Spike, (2128023)**						
	Se		200.0	188.8	µg/L	94% 75-125	
B222222-BS2	**Blank Spike, (2128023)**						
	Se		200.0	189.0	µg/L	95% 75-125	
B222222-BS3	**Blank Spike, (2128023)**						
	Se		200.0	197.7	µg/L	99% 75-125	
B222222-SRM1	**Reference Material (2214016, TMDA 51.5 Reference Standard - Bottle 8 - SRM)**						
	Se		14.30	13.47	µg/L	94% 75-125	
B222222-SRM2	**Reference Material (2214016, TMDA 51.5 Reference Standard - Bottle 8 - SRM)**						
	Se		14.30	14.06	µg/L	98% 75-125	
B222222-SRM3	**Reference Material (2214016, TMDA 51.5 Reference Standard - Bottle 8 - SRM)**						
	Se		14.30	13.53	µg/L	95% 75-125	
B222222-DUP1	**Duplicate, (2209288-12)**						
	Se	1.634		1.461	µg/L		11% 20
B222222-MS1	**Matrix Spike, (2209288-12)**						
	Se	1.634	220.0	224.4	µg/L	101% 75-125	
B222222-MSD1	**Matrix Spike Duplicate, (2209288-12)**						
	Se	1.634	220.0	225.3	µg/L	102% 75-125	0.4% 20
B222222-DUP2	**Duplicate, (2209289-04)**						
	Se	20.41		20.39	µg/L		0.08% 20
B222222-MS2	**Matrix Spike, (2209289-04)**						
	Se	20.41	220.0	234.7	µg/L	97% 75-125	

Accuracy & Precision Summary

Batch: B222222
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B222222-MSD2	**Matrix Spike Duplicate, (2209289-04)**						
	Se	20.41	220.0	236.1	µg/L	98% 75-125	0.6% 20

Method Blanks & Reporting Limits

Batch: B222130
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B222130-BLK1	0.00	µg/L
B222130-BLK2	0.00	µg/L
B222130-BLK3	0.00	µg/L
B222130-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B222130-BLK1	0.00	µg/L
B222130-BLK2	0.00	µg/L
B222130-BLK3	0.00	µg/L
B222130-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B222130-BLK1	0.00	µg/L
B222130-BLK2	0.00	µg/L
B222130-BLK3	0.00	µg/L
B222130-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B222130-BLK1	0.00	µg/L
B222130-BLK2	0.00	µg/L
B222130-BLK3	0.00	µg/L
B222130-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.004
MRL: 0.015

Analyte: Se(VI)

Sample	Result	Units
B222130-BLK1	0.00	µg/L
B222130-BLK2	0.00	µg/L
B222130-BLK3	0.00	µg/L
B222130-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: SeCN

Sample	Result	Units
B222130-BLK1	0.00	µg/L
B222130-BLK2	0.00	µg/L
B222130-BLK3	0.00	µg/L
B222130-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.010

MDL: 0.002
MRL: 0.010

Analyte: SeMet

Sample	Result	Units
B222130-BLK1	0.00	µg/L
B222130-BLK2	0.00	µg/L
B222130-BLK3	0.00	µg/L
B222130-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B222130-BLK1	0.00	µg/L
B222130-BLK2	0.00	µg/L
B222130-BLK3	0.00	µg/L
B222130-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B222130-BLK1	0.00	µg/L
B222130-BLK2	0.00	µg/L
B222130-BLK3	0.00	µg/L
B222130-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Method Blanks & Reporting Limits

Batch: B222222
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B222222-BLK1	0.107	µg/L
B222222-BLK2	0.054	µg/L
B222222-BLK3	0.052	µg/L
B222222-BLK4	0.008	µg/L

Average: 0.055
Limit: 0.480

MDL: 0.150
MRL: 0.480

Sample Containers

Lab ID: 2209288-01 **Report Matrix:** WS **Collected:** 09/12/2022
Sample: **Sample Type:** Sample + Sum **Received:** 09/22/2022
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 7 - 2209288
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 7 - 2209288
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 7 - 2209288

Lab ID: 2209288-02 **Report Matrix:** WS **Collected:** 09/12/2022
Sample: **Sample Type:** Sample + Sum **Received:** 09/22/2022
RG_LIDCOM_WS_LAEMP_LCO_2022-09_NP-NAL

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-03 **Report Matrix:** WS **Collected:** 09/12/2022
Sample: **Sample Type:** Sample + Sum **Received:** 09/22/2022
RG_LIDCOM_WS_LAEMP_LCO_2022-09_NP-NAL

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-04 **Report Matrix:** WS **Collected:** 09/14/2022
Sample: **Sample Type:** Sample + Sum **Received:** 09/22/2022
RG_LISP24_WS_LAEMP_LCO_2022-09_N

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 7 - 2209288
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 7 - 2209288
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 7 - 2209288

Sample Containers

Lab ID: 2209288-05
Sample: RG_LISP24_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/14/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-06
Sample: RG_LISP24_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/14/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-07
Sample: RG_LCUT_WS_LAEMP_LCO_2022-09_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 7 - 2209288
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 7 - 2209288
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 7 - 2209288

Lab ID: 2209288-08
Sample: RG_LCUT_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-09
Sample: RG_LCUT_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Sample Containers

Lab ID: 2209288-10 **Report Matrix:** WS **Collected:** 09/16/2022
Sample: RG_SLINE_WS_LAEMP_LCO_2022-09_N **Sample Type:** Sample + Sum **Received:** 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 7 - 2209288
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 7 - 2209288
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 7 - 2209288

Lab ID: 2209288-11 **Report Matrix:** WS **Collected:** 09/16/2022
Sample: RG_SLINE_WS_LAEMP_LCO_2022-09_NP-NAL **Sample Type:** Sample + Sum **Received:** 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-12 **Report Matrix:** WS **Collected:** 09/16/2022
Sample: RG_SLINE_WS_LAEMP_LCO_2022-09_NP-NAL **Sample Type:** Sample + Sum **Received:** 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-13 **Report Matrix:** WS **Collected:** 09/17/2022
Sample: RG_LI24_WS_LAEMP_LCO_2022-09_N **Sample Type:** Sample + Sum **Received:** 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 7 - 2209288
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 7 - 2209288
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 7 - 2209288

Sample Containers

Lab ID: 2209288-14
Sample: RG_LI24_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/17/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-15
Sample: RG_LI24_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/17/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-16
Sample: RG_LI8_WS_LAEMP_LCO_2022-09_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/17/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 7 - 2209288
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 7 - 2209288
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 7 - 2209288

Lab ID: 2209288-17
Sample: RG_LI8_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/17/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-18
Sample: RG_LI8_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/17/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Sample Containers

Lab ID: 2209288-19
Sample: RG_RIVER_WS_LAEMP_LCO_2022-09_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 7 - 2209288
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 7 - 2209288
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 7 - 2209288

Lab ID: 2209288-20
Sample: RG_RIVER_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-21
Sample: RG_RIVER_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-22
Sample: RG_FBLANK_WS_LAEMP_LCO_2022-09_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 7 - 2209288
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 7 - 2209288
C	XTRA_VOL	125 mL	na	none	na	na	Cooler 7 - 2209288

Sample Containers

Lab ID: 2209288-23
Sample: RG_FBLANK_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Lab ID: 2209288-24
Sample: RG_FBLANK_WS_LAEMP_LCO_2022-09_NP-NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2022
Received: 09/22/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	na	10% HNO3 (BAL)	2230023	<2	Cooler 1 - 2209288

Shipping Containers

Cooler 1 - 2209288

Received: September 22, 2022 7:37
Tracking No: RWHV95583 via Courier
Coolant Type: Blue Ice
Temperature: 9.5 °C
Description: Styrofoam Cooler
Damaged in transit? No
Returned to client? No
Comments: IR#:1
Custody seals present? No
Custody seals intact? No
COC present? No

Cooler 7 - 2209288

Received: September 22, 2022 7:37
Tracking No: RWHV95583 via Courier
Coolant Type: Blue Ice
Temperature: -0.8 °C
Description: Styrofoam Cooler
Damaged in transit? No
Returned to client? No
Comments: IR#:1
Custody seals present? No
Custody seals intact? No
COC present? Yes

Teck

COC ID:	REP_LAEMP_LCO_2022-09_BROOKS	TURNAROUND TIME:	Rush	RUSH:	Priority

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	Brooks Applied Labs			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Ben Wozniak			Email 1:	AquaSciLab@Teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Ben@brooksapplied.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Avenune			Address	13751 Lake City Way			Email 3:	Teck.Lab.Results@teck.com	X	X	X
					Suite 108			Email 4:	Lisa.Bowron@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Seattle	Province	WA	Email 5:	Tyler.Mehler@Teck.com	X	X	X
Postal Code	V0B 2G1	Country	Canada	Postal Code	98125	Country	United S	Email 6:	Hannah.Penner@Teck.com	X	X	X
Phone Number	1-250-865-3048			Phone Number	(206) 753-6158			PO number	VPO00817033			

SAMPLE DETAILS								ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)											
								Filt.	F	N	N								
								PRESERV.											
Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	Brooks_Se_Speciation	Brooks_Se_D	Brooks_Se_T								
RG_LIDCOM_WS_LAEMP_LCO_2022-09_N	RG_LIDCOM	WS		2022/09/12	14:40	G	1		1										
RG_LIDCOM_WS_LAEMP_LCO_2022-09_NP-NAL	RG_LIDCOM	WS		2022/09/12	14:40	G	2			1	1								
RG_LISP24_WS_LAEMP_LCO_2022-09_N	RG_LISP24	WS		2022/09/14	14:55	G	1		1										
RG_LISP24_WS_LAEMP_LCO_2022-09_NP-NAL	RG_LISP24	WS		2022/09/14	14:55	G	2			1	1								
RG_LCUT_WS_LAEMP_LCO_2022-09_N	RG_LCUT	WS		2022/09/15	11:30	G	1		1										
RG_LCUT_WS_LAEMP_LCO_2022-09_NP-NAL	RG_LCUT	WS		2022/09/15	11:30	G	2			1	1								
RG_SLINE_WS_LAEMP_LCO_2022-09_N	RG_SLINE	WS		2022/09/16	8:50	G	1		1										
RG_SLINE_WS_LAEMP_LCO_2022-09_NP-NAL	RG_SLINE	WS		2022/09/16	8:50	G	2			1	1								
RG_LI24_WS_LAEMP_LCO_2022-09_N	RG_LI24	WS		2022/09/17	8:45	G	1		1										
RG_LI24_WS_LAEMP_LCO_2022-09_NP-NAL	RG_LI24	WS		2022/09/17	8:45	G	2			1	1								

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Jennifer Ings/Minnow	###############	LKW/BAL	9/22/22 7:37

SERVICE REQUEST (rush - subject to availability)					
Regular (default)		Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Priority (2-3 business days) - 50% surcharge	X				
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature		Date/Time	September 19, 2022
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Teck Commercial

BAL Final Report 2209288

COC ID: REP_LAEMP_LCO_2022-09_BROOKS | **TURNAROUND TIME:** Rush | **RUSH:** Priority

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	Brooks Applied Labs			Report Format / Distribution	Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Ben Wozniak			Email 1: AquaSciLab@Teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Ben@brooksapplied.com			Email 2: teckcoal@equisonline.com			X
Address	421 Pine Avenune			Address	13751 Lake City Way			Email 3: Teck.Lab.Results@teck.com	X	X	X
					Suite 108			Email 4: Lisa.Bowron@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Seattle	Province	WA	Email 5: Tyler.Mehler@Teck.com	X	X	X
Postal Code	V0B 2G1	Country	Canada	Postal Code	98125	Country	United S	Email 6: Hannah.Penner@Teck.com	X	X	X
Phone Number	1-250-865-3048			Phone Number	(206) 753-6158			PO number	VPO00817033		

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIL.	PRESERV.	ANALYSIS: Brooks_Se_Speciation	Brooks_Se_D	Brooks_Se_T
								F	N	N		
RG_LI8_WS_LAEMP_LCO_2022-09_N	RG_LI8	WS		2022/09/17	14:15	G	1			1		
RG_LI8_WS_LAEMP_LCO_2022-09_NP-NAL	RG_LI8	WS		2022/09/17	14:15	G	2				1	1
RG_RIVER_WS_LAEMP_LCO_2022-09_NP	RG_RIVER	WS		2022/09/15	11:30	G	1			1		
RG_RIVER_WS_LAEMP_LCO_2022-09_NP-NAL	RG_RIVER	WS		2022/09/15	11:30	G	2				1	1
RG_FBLANK_WS_LAEMP_LCO_2022-09_NP	RG_FBLANK	WS		2022/09/15	11:30	G	1			1		
RG_FBLANK_WS_LAEMP_LCO_2022-09_NP-NAL	RG_FBLANK	WS		2022/09/15	11:30	G	2				1	1

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Jennifer Ings/Minnow	##########	VAN iBAL	9/22/22 7:37

SERVICE REQUEST (rush - subject to availability)

Regular (default)	
Priority (2-3 business days) - 50% surcharge	X
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 19, 2022

Confidential

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

BAL Final Report 2209288

No. 95583

Sparwood, BC · Terrace, BC · Red Deer, AB · Vancouver, BC · Calgary, AB · Montreal, QC · Prince George, BC · Edmonton, AB · Spokane, WA · Elkford, BC · Ft. McMurray, AB · Shelby, MT · Tumbler Ridge, BC · Hinton, AB · Gillette, WY

INVOICE TO: Cap 22094270	DATE: Sept 20/22
BILL OF LADING #	PURCHASE ORDER NUMBER: "
SHIPPER (FROM): Teck Limited	CONSIGNEE (TO): Brooks Applied Labs
STREET: Line Creek	STREET: 18751 Lake City Way NE
CITY/PROVINCE: Sparwood B.C. — POSTAL CODE	CITY/PROVINCE: Seattle WA — POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
7	Coolers – water samples	266 lbs
	RWHV95583	

FREIGHT CHARGES
SHIPPER TO CHECK
☐PREPAID ☐COLLECT
If not indicated, shipping will automatically move collect.

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
IF AT OWNER'S RISK 'WRITE'ORD HERE'

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $

DRIVER'S SIGNATURE - PICK UP BY	PICK UP TIME	DRIVER'S SIGNATURE - DELIVERY BY	FINISH TIME

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice, thereof setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, or in the case of failure to make delivery within nine (9) months from the date of shipment (b) The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below which the carrier agrees to carry and to deliver to the consigned at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written including conditions set aside by the standard Bill of Lading in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT	CONSIGNEE PRINT	DATE
SHIPPER SIGN	CONSIGNEE SIGN	TIME
		NUMBER OF PIECES RECEIVED: 7

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper **GST # 864540398RT0001**

Cooler ID: cooler 1 **COC (Y/N):** N **Temperature:** 9.5 **IR:** 1

Coolant Type: Ice ~~Blue Ice~~ (circled: Blue Ice) Ambient

Notes:

Sampling Locations: EV RG

Sample Types:	T/D (circled)	SP	T/D (circled)	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:	125 mL glass		125 mL glass							

Opened By: VMW **Date:** 9/22/22

Effective 7/29/20

COPY

Revision 004

Confidential

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

BAL Final Report 2209288

No. 95583

Sparwood, BC, Terrace, BC, Red Deer, AB, Vancouver, BC, Calgary, AB, Montreal, QC, Prince George, BC, Edmonton, AB, Spokane, WA, Elkford, BC, Ft. McMurray, AB, Shelby, MT, Tumbler Ridge, BC, Hinton, AB, Gillette, WY

INVOICE TO: Cap 22xAA4270	DATE: Sept 2/22
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM): Teck Coal Limited	CONSIGNEE (TO): Brooks Applied Labs
STREET: Line Creek	STREET: 13751 Lake City Way NE
CITY/PROVINCE: Sparwood B.C. POSTAL CODE	CITY/PROVINCE: Seattle WA POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
7	Coolers - water samples	266 lbs
	RWHV95583	

FREIGHT CHARGES
SHIPPER TO CHECK
☐PREPAID ☐COLLECT
If not indicated, shipping will automatically move collect

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $

IF AT OWNER'S RISK WRITE ORD HERE

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $

DRIVER'S SIGNATURE - PICK UP BY	PICK UP TIME	DRIVER'S SIGNATURE - DELIVERY BY	FINISH TIME

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice, thereof setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, or in the case of failure to make delivery within nine (9) months from the date of shipment. (b) The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below which the carrier agrees to carry and to deliver to the consignee at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written including conditions set aside by the standard Bill of Lading in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT	CONSIGNEE PRINT	DATE
SHIPPER SIGN	CONSIGNEE SIGN	TIME

NUMBER OF PIECES RECEIVED: 7

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROD: Shipper GST # 864540398RT0001

Cooler ID: Cooler 7 COC (Y/N): Y Temperature: -0.8 IR: 2

Coolant Type: Ice **Blue Ice** Ambient

Notes:

Sampling Locations:	RG		LC		GH					
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:		60mL Plastic, 125mL Plastic		125mL Plastic		60mL Plastic				

Opened By: ERL Date: 9/22/22

Effective 7/29/20 COPY Revision 004

SELENIUM SPECIATION

BAL Final Report 2212177

(Finalized January 10, 2023)

BROOKS APPLIED LABS
13751 Lake City Way NE, Ste 108, Seattle, WA 98125 • USA • T:206-632-6206 • info@brooksapplied.com

January 10, 2023

Teck Resources Limited – Vancouver
Cybele Heddle
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
cybele.heddle@teck.com

Re: Regional Effects Program

Dear Cybele Heddle,

On December 9, 2022, Brooks Applied Labs (BAL) received twenty-four (24) aqueous samples. The samples were logged-in for total recoverable selenium [*Se*], dissolved Se [*Se*], and Se speciation analyses, according to the chain-of-custody (COC) forms.

The **Sample Location (sys_loc_code)** values provided on the chain-of-custody (COC) forms did not match corresponding fields in the **Sample IDs** for 2212177-34, 2212177-35, and 2212177-36. Since the **Sample Location (sys_loc_code)** values usually agree with the associated field IDs, the **Sample Location (sys_loc_code)** values for 2212177-34, 2212177-35, and 2212177-36 were amended for reporting. The changes enacted are described in the table below.

Changes to Sample Location (sys_loc_code) values

Laboratory ID	Sample ID *(On COC form)*	Sample Location (sys_loc_code) *(On COC form)*	Sample Location (sys_loc_code) *(Used for reporting)*
2212177-34	RG_LIDSL_WS_LCO_2022-12_N	RG_FBLANK	RG_LIDSL
2212177-35	RG_LIDSL_WS_LCO_2022-12_N_NAL	RG_FBLANK	RG_LIDSL
2212177-36	RG_LIDSL_WS_LCO_2022-12_N_NAL	RG_FBLANK	RG_LIDSL

For 2212177-34, 2212177-35, and 2212177-36, the **Sample Location (sys_loc_code)** values in (*column 4 in the table above*) were used for reporting. These **Sample Location (sys_loc_code)** values are included in the EDD associated with this report.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL; sample fractions for total recoverable and dissolved Se had also been preserved by the client prior to receipt. All samples were stored according to BAL SOPs.

Total Recoverable Se and Dissolved Se
Each aqueous sample fraction for total recoverable and dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Selenium Speciation

Each aqueous sample was analyzed for selenium speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [*Se(IV)*], selenate [*Se(VI)*], selenocyanate [*SeCN*], methylseleninic acid [*MeSe(IV)*], methaneselenonic acid [*MeSe(VI)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified in the report as [*Unk Se Sp*].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional selenium species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting selenium species.

MeSe(VI) was observed at a concentration above the MDL in sample 2212177-01. 2212177-01 was subsequently analyzed with an MeSe(VI) spike on top of the sample and the presence of MeSe(VI) was confirmed. With the confirmation that the MeSe(VI) peak was appropriately assigned, the selenium speciation results are reported from the initial injection in batch B223031.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (**NR**) and the relative percent difference (RPD) of the MS/MSD set was not calculated (**N/C**).

In cases when either the native sample concentration was non-detectable (reported as less than or equal to the MDL) and/or the corresponding DUP result was also non-detectable, the RPD between the two values was not calculated (**N/C**).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL verifies that the reported results of all analyses for which the laboratory is accredited meet the requirements of the accrediting body, unless otherwise noted in the report narrative. For more information

regarding accreditations please see the *Report Information* and *Batch Summary* pages. This report must be used in its entirety for interpretation of results.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute
Senior Project Manager
Jeremy@brooksapplied.com

Report Information

General Disclaimers

Test results are based solely upon the sample submitted to Brooks Applied Labs in the condition it was received . This report shall not be reproduced or copied, except in full, without written approval of the laboratory. Brooks Applied Labs is not responsible for the consequences arising from the use of a partial report.

Laboratory Accreditation

BAL maintains accreditation with various state and national agencies for select test methods. For a current list of BAL accreditations, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/>. The reported analyte/matrix/method combination shall be considered outside BAL's scopes of accreditation unless otherwise identified as ISO, TNI, or ISO,TNI in the tables. It is the responsibility of the client to verify whether a specific accreditation is required for the intended data use.

ISO: ISO/IEC 17025:2017 accredited test method. Issued by ANSI National Accreditation Board (ANAB), #ADE-1447.02

TNI: NELAP accredited test method. Issued by the State of Florida Department of Health, #E87982.

ISO,TNI: Test method is accredited under both the ISO/IEC 17025:2017 and NELAP accreditations referenced above.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received	**MS**	matrix spike
BAL	Brooks Applied Labs	**MSD**	matrix spike duplicate
BLK	method blank	**ND**	non-detect
BS	blank spike	**NR**	non-reportable
CAL	calibration standard	**N/C**	not calculated
CCB	continuing calibration blank	**PS**	post preparation spike
CCV	continuing calibration verification	**REC**	percent recovery
COC	chain of custody record	**RPD**	relative percent difference
D	dissolved fraction	**SCV**	secondary calibration verification
DUP	duplicate	**SOP**	standard operating procedure
IBL	instrument blank	**SRM**	reference material
ICV	initial calibration verification	**T**	total fraction
MDL	method detection limit	**TR**	total recoverable fraction
MRL	method reporting limit		

Definition of Data Qualifiers

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_RIVER_WS_LCO_2022-12_NP	2212177-01	WS	Sample	12/01/2022	12/09/2022
RG_RIVER_WS_LCO_2022-12_NP_NAL	2212177-02	WS	Sample	12/01/2022	12/09/2022
RG_RIVER_WS_LCO_2022-12_NP_NAL	2212177-03	WS	Sample	12/01/2022	12/09/2022
RG_SLINE_WS_LCO_2022-12_N	2212177-04	WS	Sample	11/30/2022	12/09/2022
RG_SLINE_WS_LCO_2022-12_N_NAL	2212177-05	WS	Sample	11/30/2022	12/09/2022
RG_SLINE_WS_LCO_2022-12_N_NAL	2212177-06	WS	Sample	11/30/2022	12/09/2022
RG_LI24_WS_LCO_2022_12_N	2212177-07	WS	Sample	11/30/2022	12/09/2022
RG_LI24_WS_LCO_2022-12_N_NAL	2212177-08	WS	Sample	11/30/2022	12/09/2022
RG_LI24_WS_LCO_2022-12_N_NAL	2212177-09	WS	Sample	11/30/2022	12/09/2022
*RG_LISP24_WS_LCO_2022-12_N_*	2212177-10	WS	Sample	12/01/2022	12/09/2022
RG_LISP24_WS_LCO_2022-12_N_NAL	2212177-11	WS	Sample	12/01/2022	12/09/2022
RG_LISP24_WS_LCO_2022-12_N_NAL	2212177-12	WS	Sample	12/01/2022	12/09/2022
RG_LILC3_WS_LCO_2022-12_N	2212177-13	WS	Sample	12/01/2022	12/09/2022
RG_LILC3_WS_LCO_2022-12_N_NAL	2212177-14	WS	Sample	12/01/2022	12/09/2022
RG_LILC3_WS_LCO_2022-12_N_NAL	2212177-15	WS	Sample	12/01/2022	12/09/2022
RG_LCUT_WS_LCO_2022-12_N	2212177-16	WS	Sample	12/01/2022	12/09/2022
RG_LCUT_WS_LCO_2022-12_N_NAL	2212177-17	WS	Sample	12/01/2022	12/09/2022
RG_LCUT_WS_LCO_2022-12_N_NAL	2212177-18	WS	Sample	12/01/2022	12/09/2022
RG_LI8_WS_LCO_2022-12_N	2212177-19	WS	Sample	12/02/2022	12/09/2022
RG_LI8_WS_LCO_2022-12_N_NAL	2212177-20	WS	Sample	12/02/2022	12/09/2022
RG_LI8_WS_LCO_2022-12_N_NAL	2212177-21	WS	Sample	12/02/2022	12/09/2022
RG_FO23_WS_LCO_2022-12_N	2212177-22	WS	Sample	12/02/2022	12/09/2022
RG_FO23_WS_LCO_2022-12_N_NAL	2212177-23	WS	Sample	12/02/2022	12/09/2022
RG_FO23_WS_LCO_2022-12_N_NAL	2212177-24	WS	Sample	12/02/2022	12/09/2022
RG_FRUL_WS_LCO_2022-12_N	2212177-25	WS	Sample	11/29/2022	12/09/2022
RG_FRUL_WS_LCO_2022-12_N_NAL	2212177-26	WS	Sample	11/29/2022	12/09/2022

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FRUL_WS_LCO_2022-12_N_NAL	2212177-27	WS	Sample	11/29/2022	12/09/2022
RG_LIDCOM_WS_LCO_2022-12_N	2212177-28	WS	Sample	12/01/2022	12/09/2022
RG_LIDCOM_WS_LCO_2022-12_N_NAL	2212177-29	WS	Sample	12/01/2022	12/09/2022
RG_LIDCOM_WS_LCO_2022-12_N_NAL	2212177-30	WS	Sample	12/01/2022	12/09/2022
RG_FBLANK_WS_LCO_2022-12_NP	2212177-31	WS	Sample	12/01/2022	12/09/2022
RG_FBLANK_WS_LCO_2022-12_NP_NAL	2212177-32	WS	Sample	12/01/2022	12/09/2022
RG_FBLANK_WS_LCO_2022-12_NP_NAL	2212177-33	WS	Sample	12/01/2022	12/09/2022
RG_LIDSL_WS_LCO_2022-12_N	2212177-34	WS	Sample	11/29/2022	12/09/2022
RG_LIDSL_WS_LCO_2022-12_N_NAL	2212177-35	WS	Sample	11/29/2022	12/09/2022
RG_LIDSL_WS_LCO_2022-12_N_NAL	2212177-36	WS	Sample	11/29/2022	12/09/2022

Batch Summary

Analyte	Lab Matrix	Method	Accred.	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201		12/12/22	12/14/22	B223031	S221297
MeSe(IV)	Water	SOP BAL-4201		12/12/22	12/14/22	B223031	S221297
MeSe(VI)	Water	SOP BAL-4201		12/12/22	12/14/22	B223031	S221297
Se	Water	EPA 1638 Mod		12/13/22	12/14/22	B223038	S221310
Se(IV)	Water	SOP BAL-4201	ISO,TNI	12/12/22	12/14/22	B223031	S221297
Se(VI)	Water	SOP BAL-4201	ISO,TNI	12/12/22	12/14/22	B223031	S221297
SeCN	Water	SOP BAL-4201	ISO	12/12/22	12/14/22	B223031	S221297
SeMet	Water	SOP BAL-4201	ISO	12/12/22	12/14/22	B223031	S221297
SeSO3	Water	SOP BAL-4201		12/12/22	12/14/22	B223031	S221297
Unk Se Sp	Water	SOP BAL-4201		12/12/22	12/14/22	B223031	S221297

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_RIVER_WS_LCO_2022-12_NP										
2212177-01	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-01	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-01	MeSe(VI)	WS	D	0.016	J	0.010	0.025	µg/L	B223031	S221297
2212177-01	Se(IV)	WS	D	0.202		0.020	0.075	µg/L	B223031	S221297
2212177-01	Se(VI)	WS	D	31.8		0.010	0.055	µg/L	B223031	S221297
2212177-01	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-01	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-01	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-01	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_RIVER_WS_LCO_2022-12_NP_NAL										
2212177-02	Se	WS	D	33.3		0.165	0.528	µg/L	B223038	S221310
RG_RIVER_WS_LCO_2022-12_NP_NAL										
2212177-03	Se	WS	TR	34.2		0.165	0.528	µg/L	B223038	S221310
RG_SLINE_WS_LCO_2022-12_N										
2212177-04	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-04	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-04	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-04	Se(IV)	WS	D	0.026	J	0.020	0.075	µg/L	B223031	S221297
2212177-04	Se(VI)	WS	D	1.51		0.010	0.055	µg/L	B223031	S221297
2212177-04	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-04	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-04	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-04	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_SLINE_WS_LCO_2022-12_N_NAL										
2212177-05	Se	WS	D	1.44		0.165	0.528	µg/L	B223038	S221310
RG_SLINE_WS_LCO_2022-12_N_NAL										
2212177-06	Se	WS	TR	1.44		0.165	0.528	µg/L	B223038	S221310

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI24_WS_LCO_2022_12_N										
2212177-07	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-07	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-07	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-07	Se(IV)	WS	D	0.025	J	0.020	0.075	µg/L	B223031	S221297
2212177-07	Se(VI)	WS	D	2.87		0.010	0.055	µg/L	B223031	S221297
2212177-07	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-07	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-07	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-07	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_LI24_WS_LCO_2022-12_N_NAL										
2212177-08	Se	WS	D	2.58		0.165	0.528	µg/L	B223038	S221310
RG_LI24_WS_LCO_2022-12_N_NAL										
2212177-09	Se	WS	TR	2.61		0.165	0.528	µg/L	B223038	S221310
RG_LISP24_WS_LCO_2022-12_N_										
2212177-10	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-10	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-10	MeSe(VI)	WS	D	0.016	J	0.010	0.025	µg/L	B223031	S221297
2212177-10	Se(IV)	WS	D	0.193		0.020	0.075	µg/L	B223031	S221297
2212177-10	Se(VI)	WS	D	28.7		0.010	0.055	µg/L	B223031	S221297
2212177-10	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-10	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-10	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-10	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_LISP24_WS_LCO_2022-12_N_NAL										
2212177-11	Se	WS	D	33.0		0.165	0.528	µg/L	B223038	S221310
RG_LISP24_WS_LCO_2022-12_N_NAL										
2212177-12	Se	WS	TR	31.9		0.165	0.528	µg/L	B223038	S221310

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LILC3_WS_LCO_2022-12_N										
2212177-13	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-13	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-13	MeSe(VI)	WS	D	0.033		0.010	0.025	µg/L	B223031	S221297
2212177-13	Se(IV)	WS	D	0.249		0.020	0.075	µg/L	B223031	S221297
2212177-13	Se(VI)	WS	D	46.8		0.010	0.055	µg/L	B223031	S221297
2212177-13	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-13	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-13	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-13	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_LILC3_WS_LCO_2022-12_N_NAL										
2212177-14	Se	WS	D	38.8		0.165	0.528	µg/L	B223038	S221310
RG_LILC3_WS_LCO_2022-12_N_NAL										
2212177-15	Se	WS	TR	40.9		0.165	0.528	µg/L	B223038	S221310
RG_LCUT_WS_LCO_2022-12_N										
2212177-16	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-16	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-16	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-16	Se(IV)	WS	D	0.087		0.020	0.075	µg/L	B223031	S221297
2212177-16	Se(VI)	WS	D	51.6		0.010	0.055	µg/L	B223031	S221297
2212177-16	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-16	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-16	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-16	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_LCUT_WS_LCO_2022-12_N_NAL										
2212177-17	Se	WS	D	52.0		0.165	0.528	µg/L	B223038	S221310
RG_LCUT_WS_LCO_2022-12_N_NAL										
2212177-18	Se	WS	TR	50.5		0.165	0.528	µg/L	B223038	S221310

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI8_WS_LCO_2022-12_N										
2212177-19	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-19	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-19	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-19	Se(IV)	WS	D	0.024	J	0.020	0.075	µg/L	B223031	S221297
2212177-19	Se(VI)	WS	D	27.8		0.010	0.055	µg/L	B223031	S221297
2212177-19	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-19	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-19	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-19	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_LI8_WS_LCO_2022-12_N_NAL										
2212177-20	Se	WS	D	28.8		0.165	0.528	µg/L	B223038	S221310
RG_LI8_WS_LCO_2022-12_N_NAL										
2212177-21	Se	WS	TR	29.0		0.165	0.528	µg/L	B223038	S221310
RG_FO23_WS_LCO_2022-12_N										
2212177-22	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-22	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-22	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-22	Se(IV)	WS	D	0.124		0.020	0.075	µg/L	B223031	S221297
2212177-22	Se(VI)	WS	D	40.2		0.010	0.055	µg/L	B223031	S221297
2212177-22	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-22	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-22	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-22	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_FO23_WS_LCO_2022-12_N_NAL										
2212177-23	Se	WS	D	36.8		0.165	0.528	µg/L	B223038	S221310
RG_FO23_WS_LCO_2022-12_N_NAL										
2212177-24	Se	WS	TR	36.0		0.165	0.528	µg/L	B223038	S221310

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FRUL_WS_LCO_2022-12_N										
2212177-25	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-25	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-25	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-25	Se(IV)	WS	D	0.152		0.020	0.075	µg/L	B223031	S221297
2212177-25	Se(VI)	WS	D	45.7		0.010	0.055	µg/L	B223031	S221297
2212177-25	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-25	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-25	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-25	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_FRUL_WS_LCO_2022-12_N_NAL										
2212177-26	Se	WS	D	39.3		0.165	0.528	µg/L	B223038	S221310
RG_FRUL_WS_LCO_2022-12_N_NAL										
2212177-27	Se	WS	TR	39.9		0.165	0.528	µg/L	B223038	S221310
RG_LIDCOM_WS_LCO_2022-12_N										
2212177-28	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-28	MeSe(IV)	WS	D	0.012	J	0.010	0.025	µg/L	B223031	S221297
2212177-28	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-28	Se(IV)	WS	D	0.149		0.020	0.075	µg/L	B223031	S221297
2212177-28	Se(VI)	WS	D	33.7		0.010	0.055	µg/L	B223031	S221297
2212177-28	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-28	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-28	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-28	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_LIDCOM_WS_LCO_2022-12_N_NAL										
2212177-29	Se	WS	D	30.9		0.165	0.528	µg/L	B223038	S221310
RG_LIDCOM_WS_LCO_2022-12_N_NAL										
2212177-30	Se	WS	TR	30.5		0.165	0.528	µg/L	B223038	S221310

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FBLANK_WS_LCO_2022-12_NP										
2212177-31	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-31	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-31	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-31	Se(IV)	WS	D	≤ 0.020	U	0.020	0.075	µg/L	B223031	S221297
2212177-31	Se(VI)	WS	D	0.015	J	0.010	0.055	µg/L	B223031	S221297
2212177-31	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-31	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-31	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-31	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_FBLANK_WS_LCO_2022-12_NP_NAL										
2212177-32	Se	WS	D	≤ 0.165	U	0.165	0.528	µg/L	B223038	S221310
RG_FBLANK_WS_LCO_2022-12_NP_NAL										
2212177-33	Se	WS	TR	≤ 0.165	U	0.165	0.528	µg/L	B223038	S221310
RG_LIDSL_WS_LCO_2022-12_N										
2212177-34	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-34	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-34	MeSe(VI)	WS	D	0.014	J	0.010	0.025	µg/L	B223031	S221297
2212177-34	Se(IV)	WS	D	0.181		0.020	0.075	µg/L	B223031	S221297
2212177-34	Se(VI)	WS	D	39.6		0.010	0.055	µg/L	B223031	S221297
2212177-34	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B223031	S221297
2212177-34	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B223031	S221297
2212177-34	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B223031	S221297
2212177-34	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B223031	S221297
RG_LIDSL_WS_LCO_2022-12_N_NAL										
2212177-35	Se	WS	D	35.5		0.165	0.528	µg/L	B223038	S221310
RG_LIDSL_WS_LCO_2022-12_N_NAL										
2212177-36	Se	WS	TR	34.8		0.165	0.528	µg/L	B223038	S221310

Accuracy & Precision Summary

Batch: B223031
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B223031-BS1	**Blank Spike, (2236035)**						
	MeSe(IV)		5.095	6.284	µg/L	123% 75-125	
	Se(IV)		5.000	5.643	µg/L	113% 75-125	
	Se(VI)		5.000	5.283	µg/L	106% 75-125	
	SeCN		5.015	5.509	µg/L	110% 75-125	
	SeMet		4.982	5.566	µg/L	112% 75-125	
B223031-DUP3	**Duplicate, (2212177-16)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	MeSe(VI)	ND		ND	µg/L		N/C 25
	Se(IV)	0.087		0.111	µg/L		24% 25
	Se(VI)	51.62		54.64	µg/L		6% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B223031-MS3	**Matrix Spike, (2212177-16)**						
	Se(IV)	0.087	4.900	4.608	µg/L	92% 75-125	
	Se(VI)	51.62	5.100	57.99	µg/L	NR 75-125	
	SeCN	ND	1.962	1.812	µg/L	92% 75-125	
	SeMet	ND	1.977	1.852	µg/L	94% 75-125	
B223031-MSD3	**Matrix Spike Duplicate, (2212177-16)**						
	Se(IV)	0.087	4.900	4.702	µg/L	94% 75-125	2% 25
	Se(VI)	51.62	5.100	59.25	µg/L	NR 75-125	N/C 25
	SeCN	ND	1.962	1.847	µg/L	94% 75-125	2% 25
	SeMet	ND	1.977	1.972	µg/L	100% 75-125	6% 25

Accuracy & Precision Summary

Batch: B223031
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B223031-DUP4	**Duplicate, (2212179-02)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	MeSe(VI)	ND		ND	µg/L		N/C 25
	Se(IV)	0.386		0.392	µg/L		1% 25
	Se(VI)	225.2		222.3	µg/L		1% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B223031-MS4	**Matrix Spike, (2212179-02)**						
	Se(IV)	0.386	4.900	4.700	µg/L	88% 75-125	
	Se(VI)	225.2	5.100	237.8	µg/L	NR 75-125	
	SeCN	ND	1.962	2.003	µg/L	102% 75-125	
	SeMet	ND	1.977	2.054	µg/L	104% 75-125	
B223031-MSD4	**Matrix Spike Duplicate, (2212179-02)**						
	Se(IV)	0.386	4.900	4.617	µg/L	86% 75-125	2% 25
	Se(VI)	225.2	5.100	237.1	µg/L	NR 75-125	N/C 25
	SeCN	ND	1.962	1.983	µg/L	101% 75-125	1% 25
	SeMet	ND	1.977	1.936	µg/L	98% 75-125	6% 25

Accuracy & Precision Summary

Batch: B223038
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B223038-BS1	**Blank Spike, (2146024)**						
	Se		200.0	170.7	µg/L	85% 75-125	
B223038-BS2	**Blank Spike, (2146024)**						
	Se		200.0	176.0	µg/L	88% 75-125	
B223038-SRM1	**Reference Material (2128018, T221)**						
	Se		3.800	3.630	µg/L	96% 75-125	
B223038-SRM2	**Reference Material (2128018, T221)**						
	Se		3.800	3.110	µg/L	82% 75-125	
B223038-DUP2	**Duplicate, (2212177-03)**						
	Se	34.17		33.55	µg/L		2% 20
B223038-MS2	**Matrix Spike, (2212177-03)**						
	Se	34.17	220.0	227.0	µg/L	88% 75-125	
B223038-MSD2	**Matrix Spike Duplicate, (2212177-03)**						
	Se	34.17	220.0	221.3	µg/L	85% 75-125	3% 20
B223038-DUP3	**Duplicate, (2212177-18)**						
	Se	50.50		51.06	µg/L		1% 20
B223038-MS3	**Matrix Spike, (2212177-18)**						
	Se	50.50	220.0	250.5	µg/L	91% 75-125	
B223038-MSD3	**Matrix Spike Duplicate, (2212177-18)**						
	Se	50.50	220.0	241.9	µg/L	87% 75-125	4% 20
B223038-DUP4	**Duplicate, (2212177-36)**						
	Se	34.76		36.34	µg/L		4% 20

Accuracy & Precision Summary

Batch: B223038
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B223038-MS4	**Matrix Spike, (2212177-36)**						
	Se	34.76	220.0	222.2	µg/L	85% 75-125	
B223038-MSD4	**Matrix Spike Duplicate, (2212177-36)**						
	Se	34.76	220.0	224.9	µg/L	86% 75-125	1% 20

Method Blanks & Reporting Limits

Batch: B223031
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B223031-BLK1	0.00	µg/L
B223031-BLK2	0.00	µg/L
B223031-BLK3	0.00	µg/L
B223031-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B223031-BLK1	0.00	µg/L
B223031-BLK2	0.00	µg/L
B223031-BLK3	0.00	µg/L
B223031-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B223031-BLK1	0.00	µg/L
B223031-BLK2	0.00	µg/L
B223031-BLK3	0.00	µg/L
B223031-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B223031-BLK1	0.00	µg/L
B223031-BLK2	0.00	µg/L
B223031-BLK3	0.00	µg/L
B223031-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015
MDL: 0.004
MRL: 0.015

Analyte: Se(VI)

Sample	Result	Units
B223031-BLK1	0.00	µg/L
B223031-BLK2	0.00	µg/L
B223031-BLK3	0.00	µg/L
B223031-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011
MDL: 0.002
MRL: 0.011

Analyte: SeCN

Sample	Result	Units
B223031-BLK1	0.00	µg/L
B223031-BLK2	0.00	µg/L
B223031-BLK3	0.00	µg/L
B223031-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.010
MDL: 0.002
MRL: 0.010

Analyte: SeMet

Sample	Result	Units
B223031-BLK1	0.00	µg/L
B223031-BLK2	0.00	µg/L
B223031-BLK3	0.00	µg/L
B223031-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B223031-BLK1	0.00	µg/L
B223031-BLK2	0.00	µg/L
B223031-BLK3	0.00	µg/L
B223031-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B223031-BLK1	0.00	µg/L
B223031-BLK2	0.00	µg/L
B223031-BLK3	0.00	µg/L
B223031-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Method Blanks & Reporting Limits

Batch: B223038
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B223038-BLK1	-0.032	µg/L
B223038-BLK2	-0.067	µg/L
B223038-BLK3	-0.032	µg/L
B223038-BLK4	-0.107	µg/L

Average: -0.060
Limit: 0.480

MDL: 0.150
MRL: 0.480

Sample Containers

Lab ID: 2212177-01 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_RIVER_WS_LCO_2022-12_NP **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Lab ID: 2212177-02 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_RIVER_WS_LCO_2022-12_NP_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-03 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_RIVER_WS_LCO_2022-12_NP_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-04 **Report Matrix:** WS **Collected:** 11/30/2022
Sample: RG_SLINE_WS_LCO_2022-12_N **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Lab ID: 2212177-05 **Report Matrix:** WS **Collected:** 11/30/2022
Sample: RG_SLINE_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Sample Containers

Lab ID: 2212177-06 **Report Matrix:** WS **Collected:** 11/30/2022
Sample: RG_SLINE_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-07 **Report Matrix:** WS **Collected:** 11/30/2022
Sample: RG_LI24_WS_LCO_2022_12_N **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Lab ID: 2212177-08 **Report Matrix:** WS **Collected:** 11/30/2022
Sample: RG_LI24_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-09 **Report Matrix:** WS **Collected:** 11/30/2022
Sample: RG_LI24_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-10 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LISP24_WS_LCO_2022-12_N_ **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Sample Containers

Lab ID: 2212177-11 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LISP24_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-12 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LISP24_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-13 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LILC3_WS_LCO_2022-12_N **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Lab ID: 2212177-14 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LILC3_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-15 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LILC3_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Sample Containers

Lab ID: 2212177-16 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LCUT_WS_LCO_2022-12_N **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Lab ID: 2212177-17 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LCUT_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-18 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LCUT_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-19 **Report Matrix:** WS **Collected:** 12/02/2022
Sample: RG_LI8_WS_LCO_2022-12_N **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Lab ID: 2212177-20 **Report Matrix:** WS **Collected:** 12/02/2022
Sample: RG_LI8_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Sample Containers

Lab ID: 2212177-21 **Report Matrix:** WS **Collected:** 12/02/2022
Sample: RG_LI8_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-22 **Report Matrix:** WS **Collected:** 12/02/2022
Sample: RG_FO23_WS_LCO_2022-12_N **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Lab ID: 2212177-23 **Report Matrix:** WS **Collected:** 12/02/2022
Sample: RG_FO23_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-24 **Report Matrix:** WS **Collected:** 12/02/2022
Sample: RG_FO23_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-25 **Report Matrix:** WS **Collected:** 11/29/2022
Sample: RG_FRUL_WS_LCO_2022-12_N **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Sample Containers

Lab ID: 2212177-26 **Report Matrix:** WS **Collected:** 11/29/2022
Sample: RG_FRUL_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-27 **Report Matrix:** WS **Collected:** 11/29/2022
Sample: RG_FRUL_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-28 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LIDCOM_WS_LCO_2022-12_N **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Lab ID: 2212177-29 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LIDCOM_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-30 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_LIDCOM_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Sample Containers

Lab ID: 2212177-31 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_FBLANK_WS_LCO_2022-12_NP **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Lab ID: 2212177-32 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_FBLANK_WS_LCO_2022-12_NP_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-33 **Report Matrix:** WS **Collected:** 12/01/2022
Sample: RG_FBLANK_WS_LCO_2022-12_NP_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Lab ID: 2212177-34 **Report Matrix:** WS **Collected:** 11/29/2022
Sample: RG_LIDSL_WS_LCO_2022-12_N **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler 4 - 2212177
B	XTRA_VOL	15 mL	na	none	na	na	Cooler 4 - 2212177
C	XTRA_VOL	125mL	na	none	na	na	Cooler 4 - 2212177

Lab ID: 2212177-35 **Report Matrix:** WS **Collected:** 11/29/2022
Sample: RG_LIDSL_WS_LCO_2022-12_N_NAL **Sample Type:** Sample + Sum **Received:** 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Sample Containers

Lab ID: 2212177-36
Sample: RG_LIDSL_WS_LCO_2022-12_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/29/2022
Received: 12/09/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	na	10% HNO3 (BAL)	2244016	<2	Cooler 4 - 2212177

Shipping Containers

Cooler 4 - 2212177

Received: December 9, 2022 7:07
Tracking No: RWHV97351 via Courier
Coolant Type: Blue Ice
Temperature: -2.4 °C

Description: Cooler 4
Damaged in transit? No
Returned to client? No
Comments: R-IR-2

Custody seals present? No
Custody seals intact? No
COC present? Yes

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BAL Final Report 2212177

COC ID:	REP_LAEMP_LCO_2022_December_BROOKS	TURNAROUND TIME:	Regular	RUSH:	N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	Brooks Applied Labs			Report Format / Distribution	Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Ben Wozniak			Email 1: aquascilab@teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Ben@brooksapplied.com			Email 2: teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	18804 North Creek Parkway			Email 3: Teck.Lab.Results@teck.com	X	X	X
					Suite 100			Email 4: hannah.penner@teck.com	X	X	X
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 5: rhiannon.hodgson@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	United S	Email 6: lbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	(206) 753-6158			PO number	VPO00817033		

SAMPLE DETAILS								ANALYSIS REQUESTED												
								FIELD	F	F										
								PRESERV.		HNO3	HNO3									
Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	Brooks_Se_Speciation	Brooks_Se_D	Brooks_Se_T									
RG_RIVER_WS_LCO_2022-12_NP	RG_RIVER	WS	NO	1/Dec/22	13:00	G	1		1											
RG_RIVER_WS_LCO_2022-12_NP_NAL	RG_RIVER	WS	NO	1/Dec/22	13:00	G	2			1	1									
RG_SLINE_WS_LCO_2022-12_N	RG_SLINE	WS	NO	30/Nov/22	12:30	G	1		1											
RG_SLINE_WS_LCO_2022-12_N_NAL	RG_SLINE	WS	NO	30/Nov/22	12:30	G	2			1	1									
RG_LI24_WS_LCO_2022_12_N	RG_LI24	WS	NO	30/Nov/22	9:40	G	1		1											
RG_LI24_WS_LCO_2022-12_N_NAL	RG_LI24	WS	NO	30/Nov/22	9:40	G	2			1	1									
RG_LISP24_WS_LCO_2022-12_N_	RG_LISP24	WS	NO	1/Dec/22	13:30	G	1		1											
RG_LISP24_WS_LCO_2022-12_N_NAL	RG_LISP24	WS	NO	1/Dec/22	13:30	G	2			1	1									
RG_LILC3_WS_LCO_2022-12_N	RG_LILC3	WS	NO	1/Dec/22	9:15	G	1		1											
RG_LILC3_WS_LCO_2022-12_N_NAL	RG_LILC3	WS	NO	1/Dec/22	9:15	G	2			1	1									

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Rick Smit/Lotic Environmental	December 2, 2022	ERL/BAL	12/4/22 7:07

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge		Sampler's Signature	Rick Smit	Date/Time	December 2, 2022
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

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BAL Final Report 2212177

COC ID:	REP_LAEMP_LCO_2022_December_BROOKS	TURNAROUND TIME:	Regular	RUSH:	N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	Brooks Applied Labs			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Ben Wozniak			Email 1:	aquascilab@teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Ben@brooksapplied.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	18804 North Creek Parkway			Email 3:	Teck.Lab.Results@teck.com	X	X	X
					Suite 100			Email 4:	hannah.penner@teck.com	X	X	X
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 5:	rhiannon.hodgson@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	United S	Email 6:	lbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	(206) 753-6158			PO number	VPO00817033			

SAMPLE DETAILS								ANALYSIS REQUESTED (Filtered - F; Field, L: Lab, FL: Field & Lab, N: None)														
								FILT.	F	F												
								PRESERV.		HNO3	HNO3											
Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	Brooks_Se_Speciation	Brooks_Se_D	Brooks_Se_T											
RG_LCUT_WS_LCO_2022-12_N	RG_LCUT	WS	NO	1/Dec/22	11:20	G	1		1													
RG_LCUT_WS_LCO_2022-12_N_NAL	RG_LCUT	WS	NO	1/Dec/22	11:20	G	2			1	1											
RG_LI8_WS_LCO_2022-12_N	RG_LI8	WS	NO	2/Dec/22	9:45	G	1		1													
RG_LI8_WS_LCO_2022-12_N_NAL	RG_LI8	WS	NO	2/Dec/22	9:45	G	2			1	1											
RG_FO23_WS_LCO_2022-12_N	RG_FO23	WS	NO	2/Dec/22	8:30	G	1		1													
RG_FO23_WS_LCO_2022-12_N_NAL	RG_FO23	WS	NO	2/Dec/22	8:30	G	2			1	1											
RG_FRUL_WS_LCO_2022-12_N	RG_FRUL	WS	NO	29/Nov/22	9:30	G	1		1													
RG_FRUL_WS_LCO_2022-12_N_NAL	RG_FRUL	WS	NO	29/Nov/22	9:30	G	2			1	1											
RG_LIDCOM_WS_LCO_2022-12_N	RG_LIDCOM	WS	NO	1/Dec/22	15:00	G	1		1													
RG_LIDCOM_WS_LCO_2022-12_N_NAL	RG_LIDCOM	WS	NO	1/Dec/22	15:00	G	2			1	1											

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Rick Smit/Lotic Environmental	December 2, 2022	ERL/BAL	12/9/22 7:07

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature	Rick Smit	Date/Time	December 2, 2022
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

COC ID: REP_LAEMP_LCO_2022_December_BROOKS | **TURNAROUND TIME:** Regular | **RUSH:** N/A

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	Brooks Applied Labs			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Ben Wozniak			Email 1:	aquascilab@teck.com	X	X	X
Email	Cybele.Heddle@Teck.com			Email	Ben@brooksapplied.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	13751 Lake City Way NE			Email 3:	Teck.Lab.Results@teck.com	X	X	X
					Suite 108			Email 4:	hannah.penner@teck.com	X	X	X
City	Sparwood	Province	BC	City	Seattle	Province	WA	Email 5:	rhiannon.hodgson@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	98125	Country	United S	Email 6:	lbowron@minnow.ca	X	X	X
Phone Number	250-910-8755			Phone Number	(206) 753-6158			PO number	VPO00817033			

SAMPLE DETAILS — **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: Non)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIL.	F	F										
								PRESERV.	Frozen	HNO3	HNO3										
								ANALYSIS	Brooks_Se_Speciation	Brooks_Se_D	Brooks_Se_T									
RG_FBLANK_WS_LCO_2022-12_NP	RG_FBLANK	WS	NO	1-Dec-22	9:00	G	1		1											
RG_FBLANK_WS_LCO_2022-12_NP_NAL	RG_FBLANK	WS	NO	1-Dec-22	9:00	G	2			1	1									
RG_LIDSL_WS_LCO_2022-12_N	RG_FBLANK	WS	NO	29-Nov-22	13:30	G	1		1											
RG_LIDSL_WS_LCO_2022-12_N_NAL	RG_FBLANK	WS	NO	29-Nov-22	13:30	G	2			1	1									

	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Rick Smit/Lotic Environmental	December 2, 2022	ERL/BAL	12/9/22 7:07

SERVICE REQUEST (rush - subject to availability)

Regular (default)	X
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Rick Smit	Mobile #	403-586-3241
Sampler's Signature	Rick Smit	Date/Time	December 2, 2022

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 97351

Sparwood, BC · Terrace, BC · Red Deer, AB · Vancouver, BC · Calgary, AB · Montreal, QC · Prince George, BC · Edmonton, AB · Spokane, WA · Elkford, BC · Ft. McMurray, AB · Shelby, MT · Tumbler Ridge, BC · Hinton, AB · Gillette, WY

INVOICE TO: CAP	DATE: Dec 06 2022
BILL OF LADING #: 2212A1997	PURCHASE ORDER NUMBER
SHIPPER (FROM): West Laurel	CONSIGNEE (TO): Brooks Applied Labs
STREET:	STREET:
CITY/PROVINCE: Sparwood BC	CITY/PROVINCE: Seattle, WA
POSTAL CODE	POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
4	Water Samples / Coolers	
		120 lbs
	RWHV 97351	

FREIGHT CHARGES
SHIPPER TO CHECK
☐ PREPAID ☐ COLLECT
If not indicated shipping will automatically move collect

FEE ____
WAITING ____
XPU ____
CHARGES ____
FSC ____
US ____
SUB TOTAL ____
TOTAL $ ____
IF AT OWNER'S RISK WRITE ORO HERE ____

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise $

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice thereof setting out particulars of ... respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods ... (b) The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown), marked, consigned and destined as indicated below which the carrier agrees to carry and to deliver to the consignee at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party at any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the Standard Bill of Lading in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such condition.

SHIPPER PRINT	CONSIGNEE PRINT	DATE: Dec 5/22
SHIPPER SIGN	CONSIGNEE SIGN	TIME
		NUMBER OF PIECES RECEIVED: 4

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper GST # 864540398RT0001

Cooler ID: Cooler 4 COC (Y) N) Temperature: -2.4 IR: R-IR-2

Coolant Type: Ice **Blue Ice** (circled) Ambient

Notes:

Sampling Locations:	LC		RG		RG soil					
Sample Types:	T/D	SP (circled)	T/D (circled)	SP (circled)	T/D	~~SP~~	T/D	SP	T/D	SP
Container Types:		125mL Plastic	15mL cent tube	15mL cent tube		① 2 ~~4oz~~ HDPE Jar				

Opened By: ERL Date: 12/9/22

COPY

Effective 7/29/20 Revision 004

① EE ERL 12/9/22

2212177

BENTHIC COMMUNITY

Cordillera Methods and QC Report 22-13

Methods and QC Report 2022

Project ID: LCO LAEMP (22-13)

Client: Minnow Environmental

Prepared by:

Cordillera Consulting Inc.
Summerland, BC

Unit 1, 13216 Henry Ave B1202
Summerland, BC, V0H 1Z0
www.cordilleraconsulting.ca

P: 250.494.7553
F: 250.494.7562

Table of Contents

Sample Reception

On September 27, 2022, Cordillera Consulting received 30 benthic samples from Minnow Environmental. When samples arrived to Cordillera Consulting, exterior packaging was initially inspected for damage or wet spots that would have indicated damage to the interior containers.

Samples were logged into a proprietary software database (INSTAR1) where the clients assigned sample name was recorded along with a Cordillera Consulting (CC) number for cross-reference. Each sample was checked to ensure that all sites and replicates recorded on field sheets or packing lists were delivered intact and with adequate preservative. Any missing, mislabelled or extra samples were reported to the client immediately to confirm the total numbers and correct names on the sample jars. The client representative was notified of the arrival of the shipment and provided a sample inventory once intake was completed.
See table below for sample inventory:

Table 1: Summary of sample information including Cordillera Consulting (CC) number

Sample	CC#	Date	Size	# of Jars
RG_FO23_BIC-1_2022-09-09_N	CC231107	9/9/2022	400µM	1
RG_FO23_BIC-2_2022-09-09_N	CC231108	9/9/2022	400µM	1
RG_FO23_BIC-3_2022-09-09_N	CC231109	9/9/2022	400µM	1
RG_FO23_BIC-4_2022-09-09_N	CC231110	9/9/2022	400µM	1
RG_FO23_BIC-5_2022-09-10_N	CC231111	9/10/2022	400µM	1
RG_FRUL_BIC-1_2022-09-10_N	CC231112	9/10/2022	400µM	1
RG_FRUL_BIC-2_2022-09-10_N	CC231113	9/10/2022	400µM	1
RG_FRUL_BIC-3_2022-09-10_N	CC231114	9/10/2022	400µM	1
RG_LCUT_BIC-1_2022-09-15_N	CC231115	9/15/2022	400µM	1
RG_LCUT_BIC-2_2022-09-15_N	CC231116	9/15/2022	400µM	1
RG_LCUT_BIC-3_2022-09-15_N	CC231117	9/15/2022	400µM	1
RG_LIDCOM_BIC-1_2022-09-12_N	CC231118	9/12/2022	400µM	3
RG_LIDSL_BIC-1_2022-09-13_N	CC231119	9/13/2022	400µM	1
RG_LIDSL_BIC-2_2022-09-13_N	CC231120	9/13/2022	400µM	1
RG_LIDSL_BIC-3_2022-09-13_N	CC231121	9/13/2022	400µM	1
RG_LIDSL_BIC-4_2022-09-14_N	CC231122	9/14/2022	400µM	1
RG_LIDSL_BIC-5_2022-09-14_N	CC231123	9/14/2022	400µM	1
RG_LILC3_BIC-1_2022-09-08_N	CC231124	9/8/2022	400µM	3
RG_LILC3_BIC-2_2022-09-08_N	CC231125	9/8/2022	400µM	2
RG_LILC3_BIC-3_2022-09-08_N	CC231126	9/8/2022	400µM	2
RG_SLINE_BIC-1_2022-09-16_N	CC231127	9/16/2022	400µM	1
RG_SLINE_BIC-2_2022-09-16_N	CC231128	9/16/2022	400µM	1
RG_SLINE_BIC-3_2022-09-16_N	CC231129	9/16/2022	400µM	1
RG_LI24_BIC-1_2022-09-17_N	CC231130	9/17/2022	400µM	1
RG_LI24_BIC-2_2022-09-17_N	CC231131	9/17/2022	400µM	1
RG_LI24_BIC-3_2022-09-17_N	CC231132	9/17/2022	400µM	1
RG_LI8_BIC-1_2022-09-17_N	CC231133	9/17/2022	400µM	1

RG_LI8_BIC-2_2022-09-17_N	CC231134	9/17/2022	400µM	1
RG_LI8_BIC-3_2022-09-17_N	CC231135	9/17/2022	400µM	1
RG_LISP24_BIC-1_2022-09-14_N	CC231136	9/14/2022	400µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.
- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence (given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.
- Where specimens are broken or damaged, only heads were counted.
- Subsampling was conducted with the use of a Marchant Box.
- When using the Marchant box, cells were extracted at the same time in the order indicated by a random number table. If the 300th organism was found part way into sorting a cell then the balance of that cell was sorted. If the organism count had not reached 300 by the 50th cell then the entire sample was sorted.
- The total number of cells sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.
- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Sample	Date	CC#	400 micron fraction	
			% Sampled	# Invertebrates
RG_FO23_BIC-1_2022-09-09_N	09-Sep-22	CC231107	5%	317
RG_FO23_BIC-2_2022-09-09_N	09-Sep-22	CC231108	20%	471
RG_FO23_BIC-3_2022-09-09_N	09-Sep-22	CC231109	7%	327
RG_FO23_BIC-4_2022-09-09_N	09-Sep-22	CC231110	10%	318
RG_FO23_BIC-5_2022-09-10_N	10-Sep-22	CC231111	5%	326

RG_FRUL_BIC-1_2022-09-10_N	10-Sep-22	CC231112	6%	352
RG_FRUL_BIC-2_2022-09-10_N	10-Sep-22	CC231113	8%	329
RG_FRUL_BIC-3_2022-09-10_N	10-Sep-22	CC231114	8%	334
RG_LCUT_BIC-1_2022-09-15_N	15-Sep-22	CC231115	5%	425
RG_LCUT_BIC-2_2022-09-15_N	15-Sep-22	CC231116	5%	451
RG_LCUT_BIC-3_2022-09-15_N	15-Sep-22	CC231117	5%	370
RG_LIDCOM_BIC-1_2022-09-12_N	12-Sep-22	CC231118	5%	1113
RG_LIDSL_BIC-1_2022-09-13_N	13-Sep-22	CC231119	5%	560
RG_LIDSL_BIC-2_2022-09-13_N	13-Sep-22	CC231120	5%	351
RG_LIDSL_BIC-3_2022-09-13_N	13-Sep-22	CC231121	6%	331
RG_LIDSL_BIC-4_2022-09-14_N	14-Sep-22	CC231122	6%	329
RG_LIDSL_BIC-5_2022-09-14_N	14-Sep-22	CC231123	5%	364
RG_LILC3_BIC-1_2022-09-08_N	08-Sep-22	CC231124	5%	1125
RG_LILC3_BIC-2_2022-09-08_N	08-Sep-22	CC231125	5%	743
RG_LILC3_BIC-3_2022-09-08_N	08-Sep-22	CC231126	10%	1158
RG_SLINE_BIC-1_2022-09-16_N	16-Sep-22	CC231127	20%	351
RG_SLINE_BIC-2_2022-09-16_N	16-Sep-22	CC231128	5%	394
RG_SLINE_BIC-3_2022-09-16_N	16-Sep-22	CC231129	14%	349
RG_LI24_BIC-1_2022-09-17_N	17-Sep-22	CC231130	9%	353
RG_LI24_BIC-2_2022-09-17_N	17-Sep-22	CC231131	5%	313
RG_LI24_BIC-3_2022-09-17_N	17-Sep-22	CC231132	9%	364
RG_LI8_BIC-1_2022-09-17_N	17-Sep-22	CC231133	5%	447
RG_LI8_BIC-2_2022-09-17_N	17-Sep-22	CC231134	10%	338
RG_LI8_BIC-3_2022-09-17_N	17-Sep-22	CC231135	5%	408
RG_LISP24_BIC-1_2022-09-14_N	14-Sep-22	CC231136	5%	348

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.
- All sorters working on a project had at least 1 sample resorted by another sorter.
- An efficiency of 90 % was expected (95% for CABIN samples).
- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound} * 100 = \%OM$$

Table 3 Summary of sorting efficiency

		Total from Sample	Percent Efficiency
Site - QC, Sample - QC 1, CC# - CC231107, Percent sampled = 5%, Sieve size = 400			
No Invertebrates Found	0		
Total:	**0**	**317**	**100%**
Site - QC, Sample - QC 2, CC# - CC231121, Percent sampled = 6%, Sieve size = 400			
Ephemerellidae	1		
Total:	**1**	**331**	**100%**
Site - QC, Sample - QC 3, CC# - CC231129, Percent sampled = 14%, Sieve size = 400			
Plecoptera	2		
Trichoptera	1		
Diptera	1		
Total:	**4**	**349**	**99%**

Sorting Quality Control - Sub-Sampling QC

Certain Provincial and Mining projects require additional sorting checks in the form of sub-sampling QC, (Environmental Effects Monitoring (EEM) protocol). This ensured that any fraction of the total sample that was examined was actually an accurate representation of the number of total organisms. Organisms from the additional sub-samples were not identified; rather total organism count only was compared.

Sub-Sampling efficiency was measured on 10% of the number of sub-sampled samples in the project. Ex. In a project where 50 of 100 total samples were processed through subsampling using a Marchant box, then 10% of 50; or 5 samples were used for sub sampling efficiency.

Sub-Sampling efficiency was performed by fractioning the entire sample into sub-sample percentages. On each sub-sampled portion, a total organism count was recorded and compared to the rest of the sub-samples. In order to pass, all fractions were required to be within 20% of total organism count.

Example: If 300 organisms are found in 10% of the sample, the sorter will continue to sample in 10% fractions until the entire sample is separated. They will then count the

total number of organisms in each of the 10 fractions of 10% and compare the organism count.

When divergence is >20% the sorting manager examines for the source of the problem and takes steps to correct it. With the Marchant box, the problem typically rested with how the box is flipped back to the upright position. For this reason, subsampling was performed by experienced employees only. Another common source of error would be the type of debris in the sample. Samples with algae or heavy with periphyton have a higher incident of failure due to clumping than clear samples.

Table 4 Summary of Sub Sample efficiency

Station ID		Organisms in Subsample																				Sorter		Actual Total	Precision		Accuracy	
CC#	Sample Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	By	Time		Percent Range		Min	Max
231127	RG_SLINE_BIC-1_2022-09-16_N	355	322	313	353	311																CB	300	1654	0.56	12.39	2.66	7.32
231136	RG_LISP24_BIC-1_2022-09-14_N	349	340	310	335	304																AR	215	1638	1.47	12.89	2.26	7.20
231108	RG_FO23_BIC-2_2022-09-09_N	469	448	478	547	451																TS	550	2393	0.67	18.10	0.13	14.29

Taxonomic Effort

The next procedure was the identification to genus-species level where possible of all the organisms in the sample.

- Identifications were made at the genus/species level for all insect organisms found including Chironomidae (Based on CABIN protocol).
- Non-insect organisms (except those not included in CABIN count) were identified to genus/species where possible and to a minimum of family level with intact and mature specimens.
- The Standard Taxonomic Effort lists compiled by the CABIN manual[1], SAFIT[2] , and PNAMP[3] were used as a guide line for what level of identification to achieve where the condition and maturity of the organism enabled.
- Organisms from the same families/order were kept in separate vials with 80% ethanol and an interior label of printed laser paper.
- Chironomidae was identified to genus/species level where possible and was aided by slide mounts. CMC-10 was used to clear and mount the slide.
- Oligochaetes was identified to family/genus level with the aid of slide mounts. CMC-10 was used to clear and mount the slide.
- Other Annelida (leeches, polychaetes) were identified to the family/genus/species level with undamaged, mature specimens.
- Mollusca was identified to family and genus/species where possible
- Decapoda, Amphipoda and Isopoda were identified at family/genus/species level where possible.
- Bryozoans and Nemata remained at the phylum level
- Hydrachnidae and Cnidaria were identified at the family/genus level where possible.
- When requested, reference collections were made containing at least one individual from each taxa listed. Organisms represented will have been identified to the lowest practical level.
- Reference collection specimens were stored in 55 mm glass vials with screw-cap lids with polyseal inserts (museum quality). They were labeled with taxa name, site code, date identified and taxonomist name. The same information was applied to labels on the slide mounts.

Taxonomists

The taxonomists for this project were certified by the Society of Freshwater Science (SFS) Taxonomic Certification Program at level 2 which is the required certification for CABIN projects:

Scott Finlayson: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae (East/West); Group 4 Oligochaeta

Adam Bliss: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae
Rita Avery: Group 1 General Arthropods (East/West); Group 2 EPT (East/West)

Taxonomic QC

Taxonomic QC was performed in house by someone other than the original taxonomist.

- Quality control protocol involved complete, blind re-identification and re-enumeration of at least 10% of samples by a second SFS-certified taxonomist.
- Samples for taxonomic quality control were randomly selected and quality control procedures were conducted as the project progresses through the laboratories.

- The second (QC) taxonomist will calculate and record four types of errors:
    1. Misidentification error
    2. Enumeration error
    3. Questionable taxonomic resolution error
    4. Insufficient taxonomic resolution error

The QC coordinator then calculates the following estimates of taxonomic precision.

1. The percent total identification error rate is calculated as:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ organisms\ counted\ in\ audit} * (100)$$

The average total identification error rate of audited samples did not exceed 5%. All samples that exceed a 5% error rate were re-evaluated to determine whether repeated errors or patterns in error contributed.

2. The percent difference in enumeration (PDE) to quantify the consistency of specimen counts.

$$PDE = \frac{|n_1 - n_2|}{n_1 + n_2} x100$$

3. The percent taxonomic disagreement (PTD) to quantify the shared precision between two sets of identifications.

$$PTD = \left(1 - \left[\frac{a}{N}\right]\right) x100$$

4. Bray Curtis dissimilarity Index to quantify the differences in identifications.

$$BC_{ij} = 1 - \frac{2C_{ij}}{S_j + S_i}$$

Error Summary

All samples report errors within the acceptable limits for CABIN Laboratory methods (less than 5% error).

Table 5 Summary of taxonomic error following QC

Site	Taxa Identified	% Error	PDE	PTD	Bray - Curtis Dissimilarity index
Site - 2022, Sample - RG_FO23_BIC-3_2022-09-09_N, CC# - CC231109, Percent sampled = 7%, Sieve size = 400	328	0.00	0.15267176	0.6097561	0.00458015
Site - 2022, Sample - RG_LCUT_BIC-3_2022-09-15_N, CC# - CC231117, Percent sampled = 5%, Sieve size = 400	370	0.27	0	0.27027027	0.0027027
Site - 2022, Sample - RG_LI24_BIC-2_2022-09-17_N, CC# - CC231131, Percent sampled = 5%, Sieve size = 400	311	0.00	0.32051282	0.63897764	0.00320513

There will always be disagreements between taxonomists regarding the degree of taxonomic resolution in immature specimens and when laboratories make use of different keys for certain groups (Mollusks is an especially disputed group). It is always possible that some taxa found by the original taxonomist were overlooked in QC.

All of the Taxonomic QC samples that were observed passed testing according to the CABIN misidentification protocols. See the tables below for results from taxonomic QC audit.

Error Rationale

Site - 2022, Sample - RG_FO23_BIC-3_2022-09-09_N, CC# - CC231109, Percent sampled = 7%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Acentrella	1	1						
Agathon	1	1						

Arctopsyche	2	2						
Baetis	4	5	No			X		
Baetis rhodani group	54	53	No			X		
Capniidae	12	12						
Chironomidae	11	11						
Chloroperlidae	8	8						
Drunella	1	1						
Drunella doddsii	11	11						
Empididae	1	1						
Epeorus	1	1						
Eukiefferiella	1	1						
Glossosomatidae	2	2						
Heptageniidae	62	62						
Hesperoperla	2	2						
Hexatoma	1	1						
Lebertia	3	3						
Lumbriculidae	1	1						
Micrasema	1	1						
Micropsectra	10	10						
Oligochaeta	2	2						
Oribatida	1	1						
Orthocladius complex	3	3						
Pagastia	1	1						
Paraleuctra	1	1						
Pericoma/Telmatoscopus	46	46						
Perlidae	4	4						
Rhithrogena	4	4						
Rhyacophila	2	2						
Rhyacophila atrata complex	4	4						
Rhyacophila betteni group	1	1						
Rhyacophila brunnea/vemna group	1	1						
Rhyacophila narvae	1	1						
Simuliidae	2	2						
Simulium	18	19	No			X		
Stygothrombium	1	1						
Sweltsa	14	14						
Taeniopterygidae	20	20						
Tvetenia	5	5						
Zapada	2	2						
Zapada cinctipes	3	3						
Zapada columbiana	1	1						

Total:	**327**	**328**						
					0	**3**	**0**	
% Total Misidentification Rate =	misidentifications	x100 =	0.00	**Pass**				
	total number							
Site - 2022, Sample - RG_LCUT_BIC-3_2022-09-15_N, CC# - CC231117, Percent sampled = 5%, Sieve size = 400	**Laboratory Count**	**QC Audit Count**	**Agreement**	**Misidentification**	**Questionable Taxonomic Resolution**	**Enumeration**	**Insufficient Taxonomic Resolution**	**Comments**
Baetis rhodani group	1	1						
Capniidae	6	6						
Chironomidae	49	49						
Diamesa	24	25	No			X		
Diplocladius cultriger	2	2						
Ecclisomyia	6	6						
Eukiefferiella	46	45	No	1		X		
Hydropsychidae	2	2						
Kogotus	1	1						
Lebertia	6	6						
Limnephilidae	1	1						
Megarcys	2	2						
Mesocapnia	1	1						
Orthocladius complex	183	183						
Pagastia	19	19						
Parapsyche elsis	2	2						
Perlodidae	1	1						
Rheocricotopus	3	3						
Rhyacophila hyalinata group	2	2						
Sperchon	5	5						
Trichoptera	1	1						
Tvetenia	6	6						
Zapada columbiana	1	1						
Total:	**370**	**370**						
					0	**2**	**0**	
	misidentifications		0.27	**Pass**				

% Total Misidentification Rate =	total number	x100 =						
Site - 2022, Sample - RG_LI24_BIC-2_2022-09-17_N, CC# - CC231131, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Ameletus	2	2						
Baetis rhodani group	1	1						
Capniidae	4	4						
Chironomidae	5	5						
Chloroperlidae	5	5						
Cinygmula	4	4						
Clostoeca disjuncta	1	1						
Diamesa	1	1						
Drunella	3	3						
Drunella doddsii	8	8						
Epeorus	2	2						
Ephemerellidae	6	6						
Eukiefferiella	3	3						
Heptageniidae	92	90	No			X		
Leuctridae	1	1						
Megarcys	13	13						
Nemouridae	1	1						
Orthocladius complex	3	3						
Paraleuctra	2	2						
Parorthocladius	2	2						
Perlodidae	2	2						
Plumiperla	1	1						
Rheocricotopus	1	1						
Rhithrogena	8	8						
Rhyacophila	2	2						
Rhyacophila brunnea/vemna group	2	2						
Rhyacophila hyalinata group	1	1						
Sweltsa	17	17						
Taeniopterygidae	54	54						
Tvetenia	7	7						
Visoka cataractae	1	1						
Zapada columbiana	58	58						

Total:	**313**	**311**						
					0	**1**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

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[2] Southwest Association of Freshwater Invertebrate Taxonomists. (2015). www.safit.org

[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015).
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BENTHIC COMMUNITY DATA

Cordillera Raw Data from
Kick & Sweep Samples
(September 2022)

Project: 22-13 (LCO LAEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca

Site:	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022
Sample:	RG_FO23_BIC-1_2022-09-09_N	RG_FO23_BIC-2_2022-09-09_N	RG_FO23_BIC-3_2022-09-09_N	RG_FO23_BIC-4_2022-09-09_N	RG_FO23_BIC-5_2022-09-10_N	RG_FRUL_BIC-1_2022-09-10_N	RG_FRUL_BIC-2_2022-09-10_N	RG_FRUL_BIC-3_2022-09-10_N	RG_LCUT_BIC-1_2022-09-15_N	RG_LCUT_BIC-2_2022-09-15_N	RG_LCUT_BIC-3_2022-09-15_N	RG_LIDCOM_BIC-1_2022-09-12_N	RG_LIDSL_BIC-1_2022-09-13_N	RG_LIDSL_BIC-2_2022-09-13_N	RG_LIDSL_BIC-3_2022-09-13_N
Sample Collection Date:	09-Sep-22	09-Sep-22	09-Sep-22	09-Sep-22	10-Sep-22	10-Sep-22	10-Sep-22	10-Sep-22	15-Sep-22	15-Sep-22	15-Sep-22	12-Sep-22	13-Sep-22	13-Sep-22	13-Sep-22
CC#:	CC231107	CC231108	CC231109	CC231110	CC231111	CC231112	CC231113	CC231114	CC231115	CC231116	CC231117	CC231118	CC231119	CC231120	CC231121
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	50	0	20	20	0	0	0	0	0	0	60	100	160	33
| Family: Baetidae	60	45	0	10	0	50	12	25	20	0	0	240	60	40	0
Acentrella	0	5	14	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	440	95	57	20	100	133	125	225	0	0	0	120	160	100	50
Baetis rhodani group	1,140	685	771	700	840	500	412	412	80	60	20	1,980	360	460	517
Baetis bicaudatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ephemerellidae	0	0	0	0	0	0	0	0	0	0	0	140	740	240	133
Drunella	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0
Drunella doddsii	20	80	157	40	40	50	38	12	20	0	0	660	220	120	183
Drunella spinifera	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	760	275	886	560	920	1,417	825	462	180	120	0	3,280	4,060	2,560	2,100
Cinygmula	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
Epeorus	20	5	14	40	20	0	0	12	0	0	0	180	60	80	133
Rhithrogena	0	5	57	120	40	0	50	12	0	0	0	0	0	0	0
| Order: Plecoptera	20	0	0	10	0	17	25	0	40	0	0	160	20	0	0
| Family: Capniidae	120	90	171	260	180	150	275	112	100	40	120	80	20	100	33
Mesocapnia	0	0	0	0	0	0	0	0	20	40	20	0	0	0	0
| Family: Chloroperlidae	20	5	114	30	40	100	38	12	0	20	0	20	40	0	17
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plumiperla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Suwallia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa	60	30	200	140	20	200	25	12	40	60	0	40	20	80	0
| Family: Leuctridae	0	0	0	30	0	83	75	0	0	0	0	0	0	0	0
Paraleuctra	0	0	14	0	0	17	12	0	0	0	0	20	0	0	0
| Family: Nemouridae	0	5	0	0	0	150	12	12	0	0	0	120	60	20	0
Amphinemura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malenka	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Visoka cataractae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zapada	100	5	29	20	80	0	38	38	0	0	0	40	100	60	50
Zapada oregonensis group	60	0	0	0	0	0	0	0	80	20	0	60	200	160	50
Zapada cinctipes	480	70	43	60	400	217	38	175	0	20	0	0	20	0	17
Zapada columbiana	20	0	14	10	20	0	0	0	40	20	20	120	260	100	133
| Family: Peltoperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yoraperla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	180	130	57	0	0	33	50	38	0	0	0	0	0	0	0
Hesperoperla	0	35	29	80	240	200	138	88	0	0	0	0	0	0	0
| Family: Perlodidae	40	10	0	10	80	0	25	0	20	20	20	0	20	60	17
Isoperla	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0
Kogotus	100	10	0	20	20	0	12	0	40	60	20	60	40	0	17
Megarcys	40	0	0	0	100	0	0	0	40	100	40	80	0	40	50
Setvena	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Skwala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pteronarcyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Taeniopterygidae	200	165	286	180	1,040	667	488	100	0	20	0	1,220	600	120	150
| Order: Trichoptera	0	0	0	0	0	0	0	0	0	0	20	100	0	20	0
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apatania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	200	30	0	0	40	50	0	12	0	0	0	0	0	0	0
Brachycentrus americanus	20	0	0	0	20	17	0	25	0	0	0	0	0	0	0
Micrasema	40	0	14	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	29	0	0	0	12	0	0	0	0	0	0	20	17
Glossosoma	0	0	0	0	0	0	0	0	0	0	0	20	20	0	17
| Family: Hydropsychidae	20	0	0	0	20	17	0	0	0	20	40	320	500	100	150
Arctopsyche	60	5	29	10	0	0	0	12	0	0	0	0	0	0	0
Parapsyche elsis	0	0	0	0	0	0	0	0	80	60	40	100	0	20	100
| Family: Hydroptilidae	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	20	5	0	0	0	0	0	0	0	0	0	0	0	0	0

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Site:	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022
Sample:	RG_FO23_BIC-1_2022-09-09_N	RG_FO23_BIC-2_2022-09-09_N	RG_FO23_BIC-3_2022-09-09_N	RG_FO23_BIC-4_2022-09-09_N	RG_FO23_BIC-5_2022-09-10_N	RG_FRUL_BIC-1_2022-09-10_N	RG_FRUL_BIC-2_2022-09-10_N	RG_FRUL_BIC-3_2022-09-10_N	RG_LCUT_BIC-1_2022-09-15_N	RG_LCUT_BIC-2_2022-09-15_N	RG_LCUT_BIC-3_2022-09-15_N	RG_LIDCOM_BIC-1_2022-09-12_N	RG_LIDSL_BIC-1_2022-09-13_N	RG_LIDSL_BIC-2_2022-09-13_N	RG_LIDSL_BIC-3_2022-09-13_N
Sample Collection Date:	09-Sep-22	09-Sep-22	09-Sep-22	09-Sep-22	10-Sep-22	10-Sep-22	10-Sep-22	10-Sep-22	15-Sep-22	15-Sep-22	15-Sep-22	12-Sep-22	13-Sep-22	13-Sep-22	13-Sep-22
CC#:	CC231107	CC231108	CC231109	CC231110	CC231111	CC231112	CC231113	CC231114	CC231115	CC231116	CC231117	CC231118	CC231119	CC231120	CC231121
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0	20	20	0	0	0
Clostoeca disjuncta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecclisomyia	0	0	0	0	0	0	0	0	0	0	120	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	60	5	29	10	20	0	12	12	0	0	0	140	20	20	17
Rhyacophila betteni group	20	0	14	0	0	0	0	0	0	0	0	40	0	20	33
Rhyacophila brunnea/vemna group	40	5	14	0	40	0	0	0	0	0	0	20	20	20	17
Rhyacophila hyalinata group	0	0	0	0	0	0	0	0	60	20	40	60	0	40	100
Rhyacophila vetina complex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila vofixa group	0	0	0	0	0	0	0	0	0	0	0	20	0	40	33
Rhyacophila atrata complex	0	0	57	0	0	17	12	0	0	0	0	0	0	0	0
Rhyacophila narvae	20	0	14	0	0	0	0	0	0	0	0	0	0	40	17
Rhyacophila rotunda group	0	0	0	0	0	0	0	0	0	0	0	320	60	0	0
| Family: Uenoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neothremma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterlimnius	0	5	0	0	0	0	12	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Athericidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atherix	0	15	0	0	20	0	12	12	0	0	0	0	0	0	0
| Family: Blephariceridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agathon	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallochohelea	20	0	0	0	0	17	0	0	0	0	0	0	0	0	0
| Family: Chironomidae	80	55	157	60	100	67	0	50	1,620	1,640	980	1,900	1,360	480	200
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Constempellina sp. C	0	0	0	0	20	0	12	0	0	0	0	0	0	0	0
Micropsectra	180	20	143	90	60	50	62	25	0	0	0	0	80	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	0	0	0	0	0	0	0	0	440	500	480	3,300	0	80	50
Pagastia	0	10	14	0	0	0	0	12	380	280	380	180	100	200	67
Pseudodiamesa	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	20	0	0	20	0	0
Brillia	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diplocladius cultriger	0	0	0	0	0	0	0	0	120	40	40	0	20	0	0
Eukiefferiella	40	20	14	10	120	0	12	0	780	800	920	400	100	40	83
Hydrobaenus	0	10	0	0	0	0	0	0	0	40	0	20	40	0	0
Orthocladius complex	520	40	43	20	380	17	0	25	3,520	4,080	3,660	5,580	640	960	717
Parorthocladius	0	0	0	0	0	0	0	0	40	60	0	0	0	0	0
Rheocricotopus	0	25	0	10	60	17	0	25	220	220	60	140	340	60	50
Tvetenia	40	20	71	0	120	83	38	0	140	180	120	60	260	40	17
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
| Family: Empididae	0	0	14	0	20	0	0	0	20	0	0	0	0	0	0
Clinocera	0	5	0	0	0	0	12	25	20	0	0	0	0	0	0
Neoplasta	0	0	0	10	20	0	12	12	0	0	0	20	0	0	0
Oreogeton	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
Trichoclinocera	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	420	130	657	410	640	383	588	188	0	0	0	240	180	80	33
| Family: Simuliidae	0	20	29	20	220	17	75	38	0	0	0	40	40	20	0
Simulium	100	35	257	30	280	1,050	400	1,875	0	0	0	400	120	40	50
| Family: Tipulidae	20	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Dicranota	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0
Hexatoma	40	0	14	0	0	33	50	25	0	0	0	0	0	0	0

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Sample:	RG_FO23_BIC-1_2022-09-09_N	RG_FO23_BIC-2_2022-09-09_N	RG_FO23_BIC-3_2022-09-09_N	RG_FO23_BIC-4_2022-09-09_N	RG_FO23_BIC-5_2022-09-10_N	RG_FRUL_BIC-1_2022-09-10_N	RG_FRUL_BIC-2_2022-09-10_N	RG_FRUL_BIC-3_2022-09-10_N	RG_LCUT_BIC-1_2022-09-15_N	RG_LCUT_BIC-2_2022-09-15_N	RG_LCUT_BIC-3_2022-09-15_N	RG_LIDCOM_BIC-1_2022-09-12_N	RG_LIDSL_BIC-1_2022-09-13_N	RG_LIDSL_BIC-2_2022-09-13_N	RG_LIDSL_BIC-3_2022-09-13_N
Sample Collection Date:	09-Sep-22	09-Sep-22	09-Sep-22	09-Sep-22	10-Sep-22	10-Sep-22	10-Sep-22	10-Sep-22	15-Sep-22	15-Sep-22	15-Sep-22	12-Sep-22	13-Sep-22	13-Sep-22	13-Sep-22
CC#:	CC231107	CC231108	CC231109	CC231110	CC231111	CC231112	CC231113	CC231114	CC231115	CC231116	CC231117	CC231118	CC231119	CC231120	CC231121
Pedicia	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Albertathyas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hygrobates	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	280	55	43	60	60	33	50	25	100	140	120	40	40	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	40	15	0	0	0	17	0	0	220	280	100	60	60	160	67
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Testudacarus	40	0	0	20	0	0	0	12	0	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stygothrombium	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0
Rhynchelmis	0	0	0	40	0	0	0	0	20	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeus	20	0	0	0	0	0	0	0	0	20	0	0	0	0	0
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nais	60	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Phylum: Cnidaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Hydrozoa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Anthoathecatae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	**6,340**	**2,355**	**4,668**	**3,180**	**6,520**	**5,869**	**4,108**	**4,169**	**8,500**	**9,020**	**7,400**	**22,260**	**11,200**	**7,020**	**5,518**
Taxa present but not included:															
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	20	5	14	10	20	17	12	12	20	20	20	20	20	20	17
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Nemata	0	0	0	0	20	17	12	12	20	20	20	20	20	20	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	5	0	0	20	0	0	0	20	0	20	20	20	20	17
Totals:	**20**	**10**	**14**	**10**	**60**	**34**	**24**	**24**	**60**	**40**	**60**	**60**	**60**	**60**	**34**

Project: 22-13 (LCO LAEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
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Site:	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022
Sample:	RG_LIDSL_BIC-4_2022-09-14_N	RG_LIDSL_BIC-5_2022-09-14_N	RG_LILC3_BIC-1_2022-09-08_N	RG_LILC3_BIC-2_2022-09-08_N	RG_LILC3_BIC-3_2022-09-08_N	RG_SLINE_BIC-1_2022-09-16_N	RG_SLINE_BIC-2_2022-09-16_N	RG_SLINE_BIC-3_2022-09-16_N	RG_LI24_BIC-1_2022-09-17_N	RG_LI24_BIC-2_2022-09-17_N	RG_LI24_BIC-3_2022-09-17_N	RG_LI8_BIC-1_2022-09-17_N	RG_LI8_BIC-2_2022-09-17_N	RG_LI8_BIC-3_2022-09-17_N	RG_LISP24_BIC-1_2022-09-14_N
Sample Collection Date:	14-Sep-22	14-Sep-22	08-Sep-22	08-Sep-22	08-Sep-22	16-Sep-22	16-Sep-22	16-Sep-22	17-Sep-22	17-Sep-22	17-Sep-22	17-Sep-22	17-Sep-22	17-Sep-22	14-Sep-22
CC#:	CC231122	CC231123	CC231124	CC231125	CC231126	CC231127	CC231128	CC231129	CC231130	CC231131	CC231132	CC231133	CC231134	CC231135	CC231136
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	20	0	0	0	55	0	71	111	40	89	20	10	80	20
| Family: Baetidae	0	0	0	0	0	5	0	0	0	0	0	0	10	0	0
Acentrella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	33	0	40	0	10	20	140	21	0	0	11	40	10	120	80
Baetis rhodani group	150	260	0	20	20	65	120	21	0	20	11	300	130	140	500
Baetis bicaudatus	0	0	0	0	0	0	180	57	22	0	22	0	0	0	0
| Family: Ephemerellidae	167	380	20	0	0	130	680	50	111	120	178	60	0	60	280
Drunella	17	20	0	0	0	0	20	21	44	60	67	20	0	0	40
Drunella doddsii	100	100	60	40	10	120	260	129	67	160	89	720	120	360	180
Drunella spinifera	0	0	40	0	30	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	2,200	2,200	240	60	110	575	1,880	979	1,433	1,840	1,211	2,460	1,080	2,420	2,020
Cinygmula	0	40	0	0	0	5	0	14	22	80	22	0	0	0	0
Epeorus	50	20	0	0	0	45	260	29	44	40	144	100	90	140	300
Rhithrogena	0	0	0	0	0	55	80	186	22	160	111	0	10	60	40
| Order: Plecoptera	33	0	0	0	0	5	40	0	44	0	11	60	0	60	0
| Family: Capniidae	67	40	0	20	0	5	0	7	11	80	144	80	70	60	60
Mesocapnia	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	17	0	0	0	20	45	0	14	0	100	56	0	0	0	20
Haploperla	0	0	0	0	0	70	0	7	11	0	0	0	0	0	20
Plumiperla	0	0	0	0	0	0	0	0	0	20	11	0	0	0	0
Suwallia	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0
Sweltsa	0	60	20	0	40	30	140	114	89	340	122	0	0	0	40
| Family: Leuctridae	0	0	0	0	0	5	20	0	0	20	11	0	0	0	0
Paraleuctra	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0
| Family: Nemouridae	33	20	20	20	20	0	0	7	0	20	33	0	0	20	40
Amphinemura	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0
Malenka	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0
Visoka cataractae	0	0	0	0	0	5	40	21	11	20	56	0	0	0	0
Zapada	33	120	0	0	0	0	20	0	11	0	33	260	100	260	40
Zapada oregonensis group	217	340	240	120	130	20	160	14	0	0	0	120	70	380	100
Zapada cinctipes	0	0	40	0	0	0	0	0	0	0	0	40	10	100	0
Zapada columbiana	117	220	100	40	70	80	940	271	767	1,160	567	120	50	320	180
| Family: Peltoperlidae	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0
Yoraperla	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperoperla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlodidae	0	0	40	60	70	5	320	43	33	40	22	60	0	40	20
Isoperla	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0
Kogotus	0	0	120	40	80	0	0	7	0	0	0	0	0	40	0
Megarcys	100	40	20	0	10	45	280	21	33	260	289	120	60	80	120
Setvena	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
Skwala	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0
| Family: Pteronarcyidae	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0
| Family: Taeniopterygidae	283	200	0	0	0	15	20	64	733	1,080	400	2,140	690	1,640	300
| Order: Trichoptera	0	20	60	0	90	0	20	7	0	0	0	100	20	80	0
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apatania	0	0	20	0	0	0	0	0	0	0	0	40	0	40	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachycentrus americanus	0	0	0	20	0	0	0	0	0	0	0	0	0	40	0
Micrasema	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	5	0	7	0	0	0	0	10	20	20
Glossosoma	0	20	0	0	0	45	80	7	0	0	0	20	0	0	0
| Family: Hydropsychidae	150	280	0	0	10	15	40	0	0	0	22	480	110	120	80
Arctopsyche	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapsyche elsis	133	60	40	160	120	5	0	14	0	0	0	20	40	80	20
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Sample:	RG_LIDSL_BIC-4_2022-09-14_N	RG_LIDSL_BIC-5_2022-09-14_N	RG_LILC3_BIC-1_2022-09-08_N	RG_LILC3_BIC-2_2022-09-08_N	RG_LILC3_BIC-3_2022-09-08_N	RG_SLINE_BIC-1_2022-09-16_N	RG_SLINE_BIC-2_2022-09-16_N	RG_SLINE_BIC-3_2022-09-16_N	RG_LI24_BIC-1_2022-09-17_N	RG_LI24_BIC-2_2022-09-17_N	RG_LI24_BIC-3_2022-09-17_N	RG_LI8_BIC-1_2022-09-17_N	RG_LI8_BIC-2_2022-09-17_N	RG_LI8_BIC-3_2022-09-17_N	RG_LISP24_BIC-1_2022-09-14_N
Sample Collection Date:	14-Sep-22	14-Sep-22	08-Sep-22	08-Sep-22	08-Sep-22	16-Sep-22	16-Sep-22	16-Sep-22	17-Sep-22	17-Sep-22	17-Sep-22	17-Sep-22	17-Sep-22	17-Sep-22	14-Sep-22
CC#:	CC231122	CC231123	CC231124	CC231125	CC231126	CC231127	CC231128	CC231129	CC231130	CC231131	CC231132	CC231133	CC231134	CC231135	CC231136
| Family: Limnephilidae	0	0	0	20	0	5	0	7	0	0	0	0	0	0	0
Clostoeca disjuncta	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0
Ecclisomyia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	0	120	0	0	0	105	120	79	44	40	0	120	160	40	20
Rhyacophila betteni group	0	20	0	0	20	10	0	0	0	0	0	20	40	120	0
Rhyacophila brunnea/vemna group	0	20	0	20	0	5	140	21	0	40	0	140	40	60	20
Rhyacophila hyalinata group	100	100	80	0	20	40	120	29	0	20	0	60	0	40	20
Rhyacophila vetina complex	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
Rhyacophila vofixa group	33	0	0	0	0	25	40	7	0	0	0	0	0	0	0
Rhyacophila atrata complex	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0
Rhyacophila narvae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila rotunda group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Uenoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neothremma	0	0	0	0	0	5	40	14	33	0	33	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Athericidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atherix	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Blephariceridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agathon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallochohelea	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chironomidae	350	660	3,620	2,540	1,530	25	340	29	11	100	22	260	60	180	780
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Constempellina sp. C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra	0	20	120	40	70	0	20	0	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	33	140	1,180	600	400	0	140	0	0	20	56	20	0	0	120
Pagastia	100	160	820	900	430	0	0	0	0	0	0	0	0	0	60
Pseudodiamesa	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0
| Subfamily: Orthocladiinae	0	0	60	0	20	0	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0
Diplocladius cultriger	0	0	200	100	150	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	117	140	3,100	1,080	1,010	10	620	0	0	60	22	220	80	80	60
Hydrobaenus	0	0	40	180	30	0	0	0	0	0	0	20	10	20	0
Orthocladius complex	633	1,000	9,240	7,260	5,070	5	260	0	0	60	11	220	50	160	840
Parorthocladius	17	0	20	0	10	0	0	0	22	40	22	0	0	0	20
Rheocricotopus	83	140	420	280	440	0	40	14	44	20	22	20	0	20	200
Tvetenia	17	20	1,240	420	700	15	120	36	78	140	56	40	0	20	120
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Empididae	0	20	0	0	20	0	0	0	0	0	0	0	0	0	0
Clinocera	0	0	0	60	40	0	0	0	0	0	0	0	0	0	0
Neoplasta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreogeton	0	0	0	0	0	5	0	14	0	0	11	0	0	0	20
Trichoclinocera	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	33	100	60	0	20	0	20	0	11	0	0	180	170	420	80
| Family: Simuliidae	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulium	0	40	360	60	0	0	0	0	0	0	0	40	10	100	60
| Family: Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicranota	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Sample:	RG_LIDSL_BIC-4_2022-09-14_N	RG_LIDSL_BIC-5_2022-09-14_N	RG_LILC3_BIC-1_2022-09-08_N	RG_LILC3_BIC-2_2022-09-08_N	RG_LILC3_BIC-3_2022-09-08_N	RG_SLINE_BIC-1_2022-09-16_N	RG_SLINE_BIC-2_2022-09-16_N	RG_SLINE_BIC-3_2022-09-16_N	RG_LI24_BIC-1_2022-09-17_N	RG_LI24_BIC-2_2022-09-17_N	RG_LI24_BIC-3_2022-09-17_N	RG_LI8_BIC-1_2022-09-17_N	RG_LI8_BIC-2_2022-09-17_N	RG_LI8_BIC-3_2022-09-17_N	RG_LISP24_BIC-1_2022-09-14_N
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CC#:	CC231122	CC231123	CC231124	CC231125	CC231126	CC231127	CC231128	CC231129	CC231130	CC231131	CC231132	CC231133	CC231134	CC231135	CC231136
Pedicia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	80	40	10	0	0	0	0	0	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Albertathyas	0	0	0	0	0	0	20	7	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	5	20	0	0	0	0	0	0	0	0
Hygrobates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	0	0	140	180	270	5	0	7	11	0	22	0	0	20	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	33	60	480	400	410	5	40	0	22	0	22	100	30	120	20
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stygothrombium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	0	0	11	0	0	20	10	0	0
Phylum: Mollusca	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
Rhynchelmis	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeus	0	0	100	0	30	0	0	0	0	0	0	0	0	0	0
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Cnidaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Hydrozoa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Anthoathecatae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydra	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0
Totals:	**5,483**	**7,280**	**22,500**	**14,860**	**11,580**	**1,755**	**7,880**	**2,488**	**3,917**	**6,260**	**4,042**	**8,940**	**3,380**	**8,160**	**6,960**
Taxa present but not included:															
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	17	0	20	20	10	5	20	7	11	20	11	0	10	20	0
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
Phylum: Nemata	0	0	20	20	10	0	20	7	0	0	0	20	0	20	20
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	17	20	0	20	0	5	20	0	0	0	0	0	10	20	20
Totals:	**34**	**20**	**40**	**60**	**20**	**10**	**60**	**14**	**11**	**20**	**11**	**20**	**30**	**60**	**40**

BENTHIC COMMUNITY
FAMILY LEVEL DATA & BIOMASS

ZEAS No.69 2218 Raw Data

(September 2022)

Raw Benthic Invertebrate Family-Level Counts (organisms/sample) and Biomass for Samples Collected by Hess Sampler at Line Creek, September 2022

Area	Date	Sample ID	Taxa	Count	Total Biomass (g/m^2 w.w.)
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Nemata	4	0.0020
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Lebertiidae	2	0.0010
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Ostracoda	1	0.0001
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Ameletidae	25	0.0206
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Baetidae	1	0.0019
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Ephemerellidae	4	0.0221
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Heptageniidae	110	0.2812
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Capniidae	5	0.0069
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Chloroperlidae	24	0.0528
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Nemouridae	13	0.0246
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Perlodidae	1	0.0003
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Taeniopterygidae	12	0.0078
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Uenoidae	1	0.0001
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Chironomidae	5	0.0019
RG_LI24	17-Sep-22	RG_LI24_HESS-1_2022-09-17_N	Psychodidae	1	0.0002
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Nemata	2	0.0001
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Lebertiidae	2	0.0011
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Ostracoda	23	0.0058
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Ameletidae	4	0.0054
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Ephemerellidae	4	0.0242
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Heptageniidae	196	0.4010
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Capniidae	3	0.0040
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Chloroperlidae	75	0.1284
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Leuctridae	5	0.0064
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Nemouridae	22	0.0343
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Peltoperlidae	1	0.0034
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Taeniopterygidae	2	0.0008
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Hydropsychidae	1	0.0375
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Limnephilidae	1	0.0003
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Uenoidae	7	0.0044
RG_LI24	17-Sep-22	RG_LI24_HESS-2_2022-09-17_N	Chironomidae	10	0.0024
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Nemata	2	0.0004
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Lebertiidae	1	0.0002
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Sperchontidae	1	0.0010
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Ostracoda	29	0.0064
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Ameletidae	53	0.0577
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Ephemerellidae	1	0.0001
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Heptageniidae	119	0.5579
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Capniidae	14	0.0198
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Chloroperlidae	36	0.0894
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Leuctridae	9	0.0141
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Nemouridae	21	0.0240
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Taeniopterygidae	5	0.0018
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Limnephilidae	12	0.0947
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Uenoidae	3	0.0019
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Chironomidae	31	0.0129
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Empididae	3	0.0042
RG_LI24	17-Sep-22	RG_LI24_HESS-3_2022-09-17_N	Psychodidae	1	0.0003
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Lumbriculidae	1	0.0036
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Hygrobatidae	1	0.0001
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Lebertiidae	1	0.0006
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Sperchontidae	5	0.0029
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Ostracoda	9	0.0023
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Ameletidae	22	0.0250
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Baetidae	2	0.0001
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Ephemerellidae	3	0.0064
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Heptageniidae	151	0.3199
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Capniidae	4	0.0057
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Chloroperlidae	18	0.0463
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Leuctridae	4	0.0067
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Nemouridae	60	0.0814
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Perlodidae	5	0.1985
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Taeniopterygidae	33	0.0268
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Limnephilidae	3	0.0002
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Rhyacophilidae	1	0.0001
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Uenoidae	4	0.0019
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Chironomidae	37	0.0137
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Empididae	1	0.0031
RG_LI24	17-Sep-22	RG_LI24_HESS-4_2022-09-17_N	Psychodidae	2	0.0002
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Nemata	1	0.0002
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Lebertiidae	1	0.0002
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Sperchontidae	1	0.0004
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Ostracoda	3	0.0008
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Collembola	1	0.0005
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Ameletidae	6	0.0143
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Ephemerellidae	6	0.0141
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Heptageniidae	115	0.2339
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Capniidae	4	0.0049
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Chloroperlidae	16	0.0280
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Leuctridae	3	0.0055
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Nemouridae	45	0.0582
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Perlodidae	7	0.3221
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Taeniopterygidae	22	0.0164
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Hydropsychidae	1	0.1303
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Uenoidae	3	0.0020
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Chironomidae	11	0.0024
RG_LI24	17-Sep-22	RG_LI24_HESS-5_2022-09-17_N	Psychodidae	1	0.0002
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Planariidae	7	0.0173
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Lumbriculidae	16	0.1059
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Ostracoda	14	0.0095
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Ameletidae	11	0.0752
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Ephemerellidae	55	0.0512
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Heptageniidae	143	0.1112
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Chloroperlidae	77	0.1129
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Leuctridae	29	0.0217
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Nemouridae	7	0.0135
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Peltoperlidae	1	0.0082
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Perlodidae	8	0.1625
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Taeniopterygidae	1	0.0021
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Glossosomatidae	36	0.1236

Raw Benthic Invertebrate Family-Level Counts (organisms/sample) and Biomass for Samples Collected by Hess Sampler at Line Creek, September 2022

Area	Date	Sample ID	Taxa	Count	Total Biomass (g/m^2 w.w.)
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Hydropsychidae	1	0.1962
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Rhyacophilidae	21	0.2878
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Uenoidae	1	0.0021
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Chironomidae	37	0.0173
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Empididae	6	0.0985
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Psychodidae	2	0.0028
RG_SLINE	16-Sep-22	RG_SLINE_HESS-1_2022-09-16_N	Simuliidae	1	0.0069
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Lumbriculidae	11	0.0338
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Ostracoda	9	0.0004
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Ameletidae	7	0.0555
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Baetidae	2	0.0081
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Ephemerellidae	17	0.0401
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Heptageniidae	42	0.0371
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Capniidae	1	0.0001
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Chloroperlidae	19	0.0461
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Leuctridae	3	0.0052
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Peltoperlidae	1	0.0050
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Perlodidae	1	0.0435
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Taeniopterygidae	1	0.0001
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Glossosomatidae	20	0.1150
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Rhyacophilidae	19	0.4681
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Chironomidae	31	0.0084
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Empididae	10	0.0092
RG_SLINE	16-Sep-22	RG_SLINE_HESS-2_2022-09-16_N	Pelecorhyncidae	6	0.0182
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Nemata	1	0.0002
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Planariidae	2	0.0158
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Lumbriciuldae	1	0.0012
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Trombidiformes	1	0.0002
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Hygrobatidae	2	0.0002
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Lebertiidae	2	0.0134
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Sperchontidae	5	0.0016
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Ostracoda	5	0.0004
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Ameletidae	4	0.0468
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Baetidae	1	0.0008
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Ephemerellidae	43	0.0268
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Heptageniidae	79	0.0978
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Chloroperlidae	14	0.0386
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Leuctridae	4	0.0020
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Nemouridae	30	0.0836
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Peltoperlidae	1	0.0018
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Perlodidae	31	0.0636
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Glossosomatidae	3	0.0084
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Rhyacophilidae	28	1.4340
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Chironomidae	124	0.0722
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Empididae	2	0.0026
RG_SLINE	16-Sep-22	RG_SLINE_HESS-3_2022-09-16_N	Psychodidae	1	0.0002
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Planariidae	1	0.0007
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Lumbriculidae	2	0.0135
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Lebertiidae	1	0.0002
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Hydryphantidae	2	0.0014
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Ostracoda	18	0.0040
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Ameletidae	4	0.0188
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Baetidae	3	0.0038
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Ephemerellidae	12	0.0076
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Heptageniidae	130	0.2606
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Capniidae	2	0.0035
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Chloroperlidae	50	0.0984
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Leuctridae	2	0.0022
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Nemouridae	21	0.0170
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Peltoperlidae	1	0.0032
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Perlidae	1	0.0004
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Perlodidae	6	0.1416
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Taeniopterygidae	1	0.0006
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Glossosomatidae	2	0.0061
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Limnephilidae	3	0.0016
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Rhyacophilidae	8	0.0036
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Uenoidae	2	0.0010
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Chironomidae	32	0.0121
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Empididae	11	0.0314
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Pelecorhyncidae	2	0.0053
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Psychodidae	2	0.0005
RG_SLINE	16-Sep-22	RG_SLINE_HESS-4_2022-09-16_N	Tipulidae	1	0.0007
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Lumbriculidae	5	0.0270
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Ostracoda	4	0.0006
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Ameletidae	1	0.0006
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Ephemerellidae	17	0.0468
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Heptageniidae	114	0.1011
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Chloroperlidae	27	0.0409
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Leuctridae	3	0.0011
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Nemouridae	4	0.0088
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Peltoperlidae	1	0.0550
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Perlodidae	7	0.1811
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Taeniopterygidae	1	0.0002
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Glossosomatidae	6	0.0303
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Rhyacophilidae	7	0.0651
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Uenoidae	2	0.0010
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Chironomidae	20	0.0155
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Empididae	6	0.0416
RG_SLINE	16-Sep-22	RG_SLINE_HESS-5_2022-09-16_N	Pelecorhyncidae	1	0.0013
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Nemata	10	0.0112
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Planariidae	14	0.3584
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Enchytraeidae	2	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Lebertiidae	11	0.0352
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Sperchontidae	17	0.0976
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Ostracoda	47	0.0944
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Ephemerellidae	2	0.0104
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Heptageniidae	5	0.0064
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Capniidae	2	0.0488
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Chloroperlidae	3	0.0416
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Nemouridae	2	0.1648

Raw Benthic Invertebrate Family-Level Counts (organisms/sample) and Biomass for Samples Collected by Hess Sampler at Line Creek, September 2022

Area	Date	Sample ID	Taxa	Count	Total Biomass (g/m^2 w.w.)
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Perlodidae	4	0.2384
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Hydropsychidae	9	1.0827
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Limnephilidae	2	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Rhyacophilidae	2	0.1184
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Rhyacophilidae	1	0.1040
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Chironomidae	582	7.4648
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Empididae	2	0.0352
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Muscidae	1	0.3856
RG_LILC3	8-Sep-22	RG_LILC3_HESS-1_2022-09-08_N	Psychodidae	1	0.0016
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Nemata	3	0.0128
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Planariidae	10	0.1256
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Lumbricidae	3	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Trombidiformes	1	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Lebertiidae	10	0.0288
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Sperchontidae	15	0.0640
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Ostracoda	45	0.0920
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Heptageniidae	11	0.0288
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Chloroperlidae	2	0.0200
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Nemouridae	1	0.0107
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Nemouridae	2	0.0992
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Perlodidae	1	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Hydropsychidae	7	0.8500
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Limnephilidae	1	0.0016
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Chironomidae	438	3.6688
RG_LILC3	8-Sep-22	RG_LILC3_HESS-2_2022-09-08_N	Psychodidae	1	0.0016
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Nemata	24	0.0128
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Planariidae	25	0.4520
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Enchytraeidae	1	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Lebertiidae	10	0.0344
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Sperchontidae	14	0.0624
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Ostracoda	183	0.3320
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Heptageniidae	13	0.0248
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Capniidae	2	0.0856
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Nemouridae	20	1.1856
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Hydropsychidae	5	6.3664
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Limnephilidae	1	0.0016
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Rhyacophilidae	6	2.5408
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Chironomidae	739	6.5832
RG_LILC3	8-Sep-22	RG_LILC3_HESS-3_2022-09-08_N	Psychodidae	5	0.0056
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Nemata	7	0.0152
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Planariidae	11	0.1648
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Enchytraeidae	3	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Lebertiidae	6	0.0232
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Sperchontidae	3	0.0200
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Ostracoda	39	0.0800
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Baetidae	1	0.0640
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Heptageniidae	4	0.0096
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Chloroperlidae	2	0.0256
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Nemouridae	3	0.1704
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Perlodidae	1	0.0382
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Perlodidae	1	0.0024
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Hydropsychidae	8	1.0295
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Rhyacophilidae	2	0.2408
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Rhyacophilidae	4	0.9640
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Ceratopogonidae	1	0.0016
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Chironomidae	288	3.5744
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Empididae	3	0.0528
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Pelecorhyncidae	1	0.0308
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Pelecorhyncidae	1	0.0624
RG_LILC3	8-Sep-22	RG_LILC3_HESS-4_2022-09-08_N	Psychodidae	2	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Nemata	3	0.0016
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Planariidae	18	0.5552
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Trombidiformes	1	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Lebertiidae	7	0.0256
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Sperchontidae	18	0.0672
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Ostracoda	75	0.1552
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Baetidae	1	0.0584
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Ephemerellidae	1	0.0096
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Heptageniidae	3	0.0192
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Capniidae	1	0.0256
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Chloroperlidae	3	0.0464
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Nemouridae	3	0.1264
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Perlodidae	1	0.0689
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Hydropsychidae	15	2.1853
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Hydropsychidae	1	0.1232
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Rhyacophilidae	1	0.0978
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Rhyacophilidae	1	1.4008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Chironomidae	281	2.5888
RG_LILC3	8-Sep-22	RG_LILC3_HESS-5_2022-09-08_N	Empididae	1	0.0152
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Nemata	1	0.0016
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Planariidae	22	0.4176
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Enchytraeidae	1	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Lumbriculidae	1	0.0056
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Lebertiidae	5	0.0200
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Sperchontidae	12	0.0632
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Ostracoda	74	0.1696
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Heptageniidae	2	0.0056
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Chloroperlidae	2	0.0152
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Nemouridae	1	0.0544
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Chironomidae	369	3.4512
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Empididae	2	0.0272
RG_LILC3	8-Sep-22	RG_LILC3_HESS-6_2022-09-08_N	Psychodidae	2	0.0016
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Nemata	3	0.0048
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Planariidae	14	0.2160
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Enchytraeidae	3	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Lumbriculidae	2	0.0648
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Lebertiidae	1	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Sperchontidae	4	0.0120
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Ostracoda	21	0.0448
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Baetidae	1	0.0048

Raw Benthic Invertebrate Family-Level Counts (organisms/sample) and Biomass for Samples Collected by Hess Sampler at Line Creek, September 2022

Area	Date	Sample ID	Taxa	Count	Total Biomass (g/m^2 w.w.)
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Ephemerellidae	1	0.0080
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Heptageniidae	2	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Chloroperlidae	1	0.0328
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Nemouridae	4	0.3608
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Hydropsychidae	16	2.6373
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Hydropsychidae	2	1.0584
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Rhyacophilidae	1	0.0517
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Rhyacophilidae	3	0.9816
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Chironomidae	319	3.4832
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Muscidae	1	0.0104
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Psychodidae	1	0.0016
RG_LILC3	8-Sep-22	RG_LILC3_HESS-7_2022-09-08_N	Simuliidae	1	0.0112
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Nemata	44	0.0296
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Planariidae	5	0.0208
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Enchytraeidae	3	0.0032
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Lumbriculidae	2	0.0568
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Lebertiidae	10	0.0240
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Sperchontidae	6	0.0208
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Ostracoda	37	0.0624
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Heptageniidae	4	0.0024
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Nemouridae	3	0.1592
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Perlodidae	7	0.1000
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Hydropsychidae	8	1.1323
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Rhyacophilidae	8	0.3446
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Rhyacophilidae	6	1.3944
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Chironomidae	355	2.7928
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Empididae	3	0.0576
RG_LILC3	8-Sep-22	RG_LILC3_HESS-8_2022-09-08_N	Psychodidae	2	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Nemata	2	0.0004
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Planariidae	5	0.0352
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Enchytraeidae	3	0.0004
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Lumbriculidae	1	0.0120
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Lebertiidae	4	0.0028
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Sperchontidae	13	0.0212
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Ostracoda	7	0.0056
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Ephemerellidae	1	0.0028
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Heptageniidae	2	0.0032
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Chloroperlidae	2	0.0116
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Nemouridae	5	0.1448
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Perlodidae	2	0.0988
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Hydropsychidae	1	0.1521
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Chironomidae	225	1.2756
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Empididae	3	0.0168
RG_LILC3	8-Sep-22	RG_LILC3_HESS-9_2022-09-08_N	Psychodidae	2	0.0012
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Nemata	6	0.0112
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Planariidae	20	0.3736
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Enchytraeidae	5	0.0040
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Lumbriculidae	1	0.0712
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Naididae	1	0.0048
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Lebertiidae	8	0.0216
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Sperchontidae	26	0.1264
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Ostracoda	34	0.0712
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Ephemerellidae	1	0.0056
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Heptageniidae	1	0.0024
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Chloroperlidae	5	0.0752
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Nemouridae	2	0.1280
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Perlodidae	1	0.0064
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Hydropsychidae	17	1.7726
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Hydropsychidae	1	0.0008
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Limnephilidae	1	0.0048
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Chironomidae	479	3.7728
RG_LILC3	8-Sep-22	RG_LILC3_HESS-10_2022-09-08_N	Empididae	2	0.0304
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Nemata	5	0.0026
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Planariidae	8	0.0176
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Lumbricidae	1	0.0084
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Sperchontidae	1	0.0010
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Ameletidae	1	0.0008
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Baetidae	2	0.0068
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Ephemerellidae	5	0.0088
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Heptageniidae	114	0.0928
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Capniidae	2	0.0014
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Chloroperlidae	10	0.0262
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Leuctridae	10	0.0204
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Nemouridae	11	0.0722
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Perlodidae	3	0.0914
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Perlodidae	1	0.0124
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Taeniopterygidae	8	0.0022
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Hydropsychidae	6	0.5434
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Hydropsychidae	3	0.0020
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Rhyacophilidae	4	0.0110
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Chironomidae	165	0.5180
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Empididae	7	0.0290
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-1_2022-09-13_N	Psychodidae	38	0.0194
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Nemata	2	0.0002
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Planariidae	5	0.0120
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Lumbricidae	1	0.0132
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Sperchontidae	4	0.0002
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Ostracoda	3	0.0008
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Ameletidae	3	0.0002
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Baetidae	2	0.0218
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Ephemerellidae	13	0.0084
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Heptageniidae	1	0.0119
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Heptageniidae	87	0.0924
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Chloroperlidae	2	0.0002
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Nemouridae	3	0.0128
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Nemouridae	14	0.1504
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Perlodidae	1	0.0129
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Perlodidae	1	0.0002
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Taeniopterygidae	4	0.0014
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Glossosomatidae	2	0.0112

Raw Benthic Invertebrate Family-Level Counts (organisms/sample) and Biomass for Samples Collected by Hess Sampler at Line Creek, September 2022

Area	Date	Sample ID	Taxa	Count	Total Biomass (g/m^2 w.w.)
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Hydropsychidae	1	0.1060
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Hydropsychidae	3	0.0022
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Rhyacophilidae	9	0.2483
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Rhyacophilidae	5	0.0104
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Chironomidae	5	0.0269
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Chironomidae	232	0.4946
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Empididae	3	0.0098
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-2_2022-09-13_N	Psychodidae	38	0.0244
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Nemata	1	0.0002
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Planariidae	12	0.0324
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Lumbriculidae	3	0.0170
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Lebertiidae	1	0.0002
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Sperchontidae	3	0.0010
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Ostracoda	14	0.0068
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Elmidae	2	0.0002
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Ameletidae	8	0.0076
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Baetidae	4	0.0466
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Ephemerellidae	11	0.0080
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Heptageniidae	1	0.0120
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Heptageniidae	138	0.1606
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Capniidae	1	0.0008
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Chloroperlidae	18	0.0528
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Leuctridae	13	0.0266
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Nemouridae	2	0.0052
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Perlodidae	3	0.0054
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Taeniopterygidae	4	0.0002
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Apataniidae	4	0.0020
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Glossosomatidae	2	0.0298
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Hydropsychidae	1	0.1185
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Hydropsychidae	4	0.0042
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Rhyacophilidae	2	0.0543
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Rhyacophilidae	6	0.0716
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Chironomidae	2	0.0208
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Chironomidae	232	0.6790
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Empididae	5	0.0244
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Pelecorhyncidae	3	0.0124
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-3_2022-09-13_N	Psychodidae	103	0.0534
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Nemata	3	0.0002
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Planariidae	10	0.0486
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Lumbricidae	2	0.0322
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Sperchontidae	5	0.0032
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Ostracoda	29	0.0118
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Elmidae	1	0.0006
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Ameletidae	29	0.0232
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Baetidae	6	0.0716
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Ephemerellidae	7	0.0046
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Heptageniidae	147	0.3050
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Capniidae	2	0.0038
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Chloroperlidae	20	0.0770
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Leuctridae	10	0.0180
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Nemouridae	10	0.1188
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Taeniopterygidae	6	0.0008
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Hydropsychidae	4	0.4165
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Limnephilidae	1	0.0004
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Rhyacophilidae	11	0.2446
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Chironomidae	1	0.0080
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Chironomidae	235	0.6358
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Empididae	3	0.0078
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Psychodidae	58	0.0298
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-4_2022-09-13_N	Limoniidae	1	0.3847
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Nemata	2	0.0004
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Planariidae	7	0.0284
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Lumbriculidae	18	0.0940
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Sperchontidae	1	0.0002
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Ostracoda	4	0.0032
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Ameletidae	20	0.0148
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Baetidae	20	0.1132
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Ephemerellidae	14	0.0202
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Heptageniidae	230	0.2774
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Capniidae	4	0.0044
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Chloroperlidae	12	0.0340
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Leuctridae	2	0.0030
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Nemouridae	16	0.1286
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Perlodidae	1	0.0131
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Perlodidae	1	0.0008
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Taeniopterygidae	6	0.0024
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Apataniidae	1	0.0010
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Hydropsychidae	15	2.0093
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Hydropsychidae	1	0.0006
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Rhyacophilidae	3	0.0825
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Rhyacophilidae	9	0.1868
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Ceratopogonidae	2	0.0012
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Chironomidae	82	0.1962
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Empididae	5	0.0174
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Pelecorhyncidae	1	0.0132
RG_LIDSL	13-Sep-22	RG_LIDSL_HESS-5_2022-09-13_N	Psychodidae	21	0.0080
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Planariidae	8	0.0222
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Lumbriculidae	3	0.0129
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Hydryphantidae	1	0.0002
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Sperchontidae	6	0.0086
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Ostracoda	4	0.0024
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Ameletidae	7	0.0056
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Baetidae	15	0.1836
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Ephemerellidae	1	0.0543
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Ephemerellidae	10	0.0220
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Heptageniidae	178	0.2398
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Capniidae	4	0.0060
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Chloroperlidae	14	0.0450
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Leuctridae	3	0.0064
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Nemouridae	4	0.0448

Raw Benthic Invertebrate Family-Level Counts (organisms/sample) and Biomass for Samples Collected by Hess Sampler at Line Creek, September 2022

Area	Date	Sample ID	Taxa	Count	Total Biomass (g/m^2 w.w.)
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Perlodidae	2	0.0038
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Taeniopterygidae	1	0.0002
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Apataniidae	2	0.0010
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Glossosomatidae	4	0.0148
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Limnephilidae	2	0.0028
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Rhyacophilidae	4	0.1306
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Rhyacophilidae	4	0.0250
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Ceratopogonidae	1	0.0024
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Chironomidae	91	0.3712
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Empididae	2	0.0066
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Psychodidae	15	0.0082
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Simuliidae	1	0.0064
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-6_2022-09-13_N	Limoniidae	7	0.6798
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Nemata	4	0.0001
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Planariidae	19	0.0552
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Enchytraeidae	6	0.0021
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Lumbriculidae	1	0.0009
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Lebertiidae	3	0.0009
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Sperchontidae	3	0.0017
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Ostracoda	15	0.0034
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Elmidae	38	0.0173
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Ameletidae	2	0.0014
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Baetidae	7	0.0077
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Ephemerellidae	14	0.0109
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Heptageniidae	117	0.0669
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Chloroperlidae	42	0.0231
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Leuctridae	17	0.0092
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Nemouridae	25	0.0932
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Perlodidae	5	0.0432
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Taeniopterygidae	5	0.0003
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Glossosomatidae	1	0.0001
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Hydropsychidae	1	0.0002
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Limnephilidae	1	0.0002
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Rhyacophilidae	33	0.0478
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Chironomidae	66	0.0497
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Empididae	6	0.0072
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Pelecorhyncidae	19	0.0992
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-7_2022-09-13_N	Psychodidae	33	0.0060
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Nemata	1	0.0001
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Planariidae	38	0.0921
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Enchytraeidae	3	0.0012
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Lumbricidae	3	0.0107
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Ostracoda	22	0.0055
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Elmidae	10	0.0122
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Ameletidae	1	0.0001
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Baetidae	5	0.0387
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Ephemerellidae	12	0.0145
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Heptageniidae	215	0.1065
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Capniidae	1	0.0002
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Chloroperlidae	8	0.0064
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Leuctridae	5	0.0022
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Nemouridae	30	0.0472
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Perlodidae	3	0.0532
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Taeniopterygidae	2	0.0002
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Hydropsychidae	2	0.0535
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Rhyacophilidae	52	0.1266
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Chironomidae	68	0.0640
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Empididae	9	0.0086
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Pelecorhyncidae	17	0.0806
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Psychodidae	122	0.0256
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-8_2022-09-13_N	Stratiomyidae	2	0.0208
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Planariidae	5	0.0202
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Lumbriculidae	1	0.0132
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Lebertiidae	1	0.0002
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Sperchontidae	3	0.0020
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Ameletidae	14	0.0510
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Baetidae	2	0.0108
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Ephemerellidae	4	0.0054
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Heptageniidae	108	0.1014
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Capniidae	2	0.0034
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Chloroperlidae	7	0.0268
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Leuctridae	4	0.0134
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Nemouridae	9	0.0634
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Perlodidae	3	0.0474
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Taeniopterygidae	3	0.0006
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Glossosomatidae	3	0.0464
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Hydropsychidae	2	0.6740
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Limnephilidae	2	0.0010
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Rhyacophilidae	13	0.2772
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Uenoidae	2	0.0006
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Chironomidae	51	0.1948
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Empididae	1	0.0036
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Pelecorhyncidae	2	0.0426
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Psychodidae	15	0.0170
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-9_2022-09-13_N	Tipulidae	2	0.0088
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Nemata	3	0.0009
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Planariidae	3	0.0037
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Lumbricidae	8	0.0483
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Lebertiidae	4	0.0016
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Sperchontidae	2	0.0007
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Ostracoda	11	0.0029
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Ameletidae	8	0.0019
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Baetidae	9	0.0520
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Ephemerellidae	29	0.1088
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Heptageniidae	336	0.2218
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Capniidae	7	0.0042
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Chloroperlidae	28	0.0596
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Leuctridae	4	0.0044
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Nemouridae	14	0.0631
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Perlodidae	1	0.0141

Raw Benthic Invertebrate Family-Level Counts (organisms/sample) and Biomass for Samples Collected by Hess Sampler at Line Creek, September 2022

Area	Date	Sample ID	Taxa	Count	Total Biomass (g/m^2 w.w.)
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Taeniopterygidae	22	0.0052
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Apataniidae	2	0.0002
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Glossosomatidae	5	0.0144
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Hydropsychidae	3	0.2378
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Rhyacophilidae	18	0.2607
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Ceratopogonidae	1	0.0011
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Chironomidae	67	0.0634
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Empididae	9	0.0172
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Psychodidae	43	0.0081
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Simuliidae	3	0.0080
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Limoniidae	2	0.2616
RG_LIDSL	14-Sep-22	RG_LIDSL_HESS-10_2022-09-13_N	Pediciidae	1	0.0009

BENTHIC TISSUE CHEMISTRY

TrichAnalytics Laboratory Report 2022-331

(Finalized May 20, 2022)

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Tyler Mehler
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Date Received:	13 May 2022
Date of Analysis:	16 May 2022
Final Report Date:	20 May 2022
Project No.:	2022-331
Method No.:	MET-002.06

Client Project: Unspecified

Analytical Request: Invertebrate Tissue Microchemistry (total metals and moisture) - 50 samples.
See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in parts per million (ppm) dry weight (equivalent to mg/kg)
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.
Client specific DQO for Selenium accuracy is 90-110% of the certified value; result achieved 102% (ranging from 101-106%).

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio — 20 May 2022 (Date)

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
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CALA Testing Accreditation No. A4196

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FO23_INV-1_2022-05-04	RG_FO23_INV-2_2022-05-04	RG_FO23_INV-3_2022-05-04	RG_FO23_INV-4_2022-05-04	RG_FO23_INV-5_2022-05-04
		Lab ID	201	202	203	204	205
		Wet Weight (g)	1.3500	1.0399	1.7314	1.1576	0.8998
		Dry Weight (g)	0.3172	0.2995	0.3002	0.2576	0.1895
		Moisture (%)	76.5	71.2	82.7	77.7	78.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.003	0.010	0.668	0.526	0.640	1.0	2.8
11B	0.066	0.220	2.1	1.6	2.1	4.2	9.7
23Na	0.981	3.3	3,148	2,774	2,444	2,684	3,117
24Mg	0.017	0.057	2,036	1,605	1,805	1,850	2,236
27Al	0.017	0.057	951	362	932	2,436	4,167
31P	59	197	12,876	11,656	10,483	11,517	11,217
39K	2.2	7.3	9,165	9,874	8,512	10,314	14,590
44Ca	7.5	25	5,025	2,795	5,151	5,397	14,194
49Ti	0.209	0.697	68	26	60	178	275
51V	0.072	0.240	1.7	0.572	1.5	3.3	7.3
52Cr	0.195	0.650	13	3.8	6.3	17	40
55Mn	0.007	0.023	26	30	37	37	67
57Fe	0.859	2.9	557	196	423	1,051	2,193
59Co	0.005	0.017	1.4	0.636	2.2	3.4	3.2
60Ni	0.028	0.093	21	6.3	12	28	58
63Cu	0.009	0.030	13	16	20	18	21
66Zn	0.354	1.2	559	251	550	408	376
75As	0.545	1.8	0.555	<0.545	<0.545	1.0	1.7
77Se	0.337	1.1	7.0	5.3	6.6	7.0	8.7
88Sr	0.001	0.003	5.4	4.0	5.8	8.5	15
95Mo	0.005	0.017	0.246	0.246	0.270	0.358	0.588
107Ag	0.001	0.003	0.092	0.066	0.093	0.090	0.168
111Cd	0.114	0.380	0.943	0.742	2.3	4.1	2.3
118Sn	0.057	0.190	0.245	0.352	0.491	0.604	0.725
121Sb	0.004	0.013	0.063	0.087	0.040	0.049	0.149
137Ba	0.001	0.003	30	24	28	54	92
202Hg	0.021	0.070	0.122	0.060	0.081	0.095	0.096
205Tl	0.001	0.003	0.030	0.020	0.026	0.042	0.059
208Pb	0.002	0.007	0.284	0.198	0.226	0.599	1.5
238U	0.001	0.003	0.054	0.043	0.068	0.095	0.192

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FRUL_INV-1_2022-05-02	RG_FRUL_INV-2_2022-05-02	RG_FRUL_INV-3_2022-05-02	RG_FRUL_INV-4_2022-05-02	RG_FRUL_INV-5_2022-05-02
		Lab ID	206	207	208	209	210
		Wet Weight (g)	0.9207	0.6994	1.1125	1.1206	0.6672
		Dry Weight (g)	0.1526	0.1396	0.1591	0.2680	0.1287
		Moisture (%)	83.4	80.0	85.7	76.1	80.7
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.003	0.010	0.774	0.699	1.0	0.572	1.0
11B	0.066	0.220	1.4	1.8	1.9	1.3	2.1
23Na	0.981	3.3	2,940	2,974	2,600	2,703	4,008
24Mg	0.017	0.057	2,066	1,550	2,009	2,689	1,656
27Al	0.017	0.057	703	910	998	624	1,009
31P	59	197	13,053	10,427	10,806	13,465	11,524
39K	2.2	7.3	7,748	10,054	6,752	7,723	9,758
44Ca	7.5	25	6,946	4,945	7,850	9,070	4,901
49Ti	0.209	0.697	39	59	64	38	70
51V	0.072	0.240	1.2	1.6	1.8	1.1	1.8
52Cr	0.195	0.650	6.2	9.2	12	7.1	8.6
55Mn	0.007	0.023	38	40	39	37	41
57Fe	0.859	2.9	390	500	591	394	547
59Co	0.005	0.017	0.686	0.863	0.970	0.477	0.960
60Ni	0.028	0.093	11	14	19	14	15
63Cu	0.009	0.030	20	16	19	24	16
66Zn	0.354	1.2	306	254	304	395	247
75As	0.545	1.8	<0.545	<0.545	<0.545	<0.545	0.618
77Se	0.337	1.1	7.8	7.4	7.7	7.8	7.9
88Sr	0.001	0.003	7.1	4.9	8.6	7.6	5.2
95Mo	0.005	0.017	0.346	0.286	0.310	0.342	0.350
107Ag	0.001	0.003	0.239	0.173	0.210	0.308	0.222
111Cd	0.114	0.380	1.9	1.1	1.5	0.863	1.3
118Sn	0.057	0.190	0.614	0.514	0.481	0.285	0.708
121Sb	0.004	0.013	0.046	0.077	0.050	0.036	0.079
137Ba	0.001	0.003	39	33	52	36	38
202Hg	0.021	0.070	0.077	0.071	0.087	0.077	0.093
205Tl	0.001	0.003	0.021	0.023	0.020	0.016	0.029
208Pb	0.002	0.007	0.227	0.372	0.288	0.216	0.365
238U	0.001	0.003	0.056	0.076	0.081	0.045	0.109

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LCUT_INV-1_2022-05-02	RG_LCUT_INV-2_2022-05-02	RG_LCUT_INV-3_2022-05-02	RG_LCUT_INV-4_2022-05-02	RG_LCUT_INV-5_2022-05-02
		Lab ID	211	212	213	214	215
		Wet Weight (g)	1.3792	1.8716	1.6649	1.6392	1.4666
		Dry Weight (g)	0.3017	0.3423	0.3593	0.3066	0.2751
		Moisture (%)	78.1	81.7	78.4	81.3	81.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.003	0.010	0.692	0.852	0.702	0.681	1.3
11B	0.066	0.220	2.6	2.9	2.3	2.5	3.9
23Na	0.981	3.3	2,372	2,470	2,889	2,273	3,432
24Mg	0.017	0.057	1,220	1,350	1,400	1,182	1,711
27Al	0.017	0.057	1,053	900	876	523	2,384
31P	59	197	9,237	8,057	12,321	9,826	13,281
39K	2.2	7.3	8,488	8,817	9,517	8,456	11,836
44Ca	7.5	25	2,046	2,891	1,969	2,406	4,699
49Ti	0.209	0.697	66	46	57	26	166
51V	0.072	0.240	2.0	1.5	1.5	1.0	3.9
52Cr	0.195	0.650	4.3	3.4	4.9	4.1	13
55Mn	0.007	0.023	24	21	22	26	35
57Fe	0.859	2.9	360	266	317	201	877
59Co	0.005	0.017	2.3	0.923	0.959	0.944	2.2
60Ni	0.028	0.093	14	13	15	13	30
63Cu	0.009	0.030	26	22	20	25	28
66Zn	0.354	1.2	351	270	220	277	275
75As	0.545	1.8	2.1	1.2	1.3	1.7	2.1
77Se	0.337	1.1	5.2	4.8	5.5	5.8	6.6
88Sr	0.001	0.003	4.0	4.5	3.9	3.9	8.0
95Mo	0.005	0.017	0.501	0.365	0.262	0.362	0.564
107Ag	0.001	0.003	0.045	0.029	0.027	0.047	0.064
111Cd	0.114	0.380	4.8	1.8	2.2	3.2	4.4
118Sn	0.057	0.190	0.355	0.344	0.187	0.378	0.416
121Sb	0.004	0.013	0.110	0.085	0.069	0.067	0.130
137Ba	0.001	0.003	57	39	40	43	85
202Hg	0.021	0.070	0.139	0.135	0.112	0.149	0.166
205Tl	0.001	0.003	0.043	0.035	0.036	0.030	0.059
208Pb	0.002	0.007	0.549	0.362	0.511	0.421	1.0
238U	0.001	0.003	0.102	0.118	0.075	0.089	0.187

Notes:

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< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LI8_INV-1_2022-05-04	RG_LI8_INV-2_2022-05-04	RG_LI8_INV-3_2022-05-04	RG_LI8_INV-4_2022-05-04	RG_LI8_INV-5_2022-05-04
		Lab ID	216	217	218	219	220
		Wet Weight (g)	1.9484	2.6343	2.5137	2.0625	2.6700
		Dry Weight (g)	0.3942	0.5490	0.5489	0.4200	0.6274
		Moisture (%)	79.8	79.2	78.2	79.6	76.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.003	0.010	0.601	0.274	0.682	0.520	0.573
11B	0.066	0.220	2.2	0.945	2.8	1.6	1.9
23Na	0.981	3.3	2,647	2,657	2,807	2,916	2,818
24Mg	0.017	0.057	1,964	1,113	1,977	1,576	1,096
27Al	0.017	0.057	601	242	663	386	614
31P	59	197	11,873	9,875	11,077	9,674	11,330
39K	2.2	7.3	8,218	7,153	8,761	7,187	9,314
44Ca	7.5	25	6,383	1,571	4,883	2,646	2,613
49Ti	0.209	0.697	64	16	40	32	43
51V	0.072	0.240	1.3	0.459	1.1	0.618	0.940
52Cr	0.195	0.650	5.0	2.1	5.6	3.9	4.7
55Mn	0.007	0.023	90	76	100	59	93
57Fe	0.859	2.9	403	177	422	294	372
59Co	0.005	0.017	1.2	0.591	1.8	1.1	0.927
60Ni	0.028	0.093	24	8.7	30	21	18
63Cu	0.009	0.030	21	13	21	19	16
66Zn	0.354	1.2	473	322	645	414	300
75As	0.545	1.8	0.903	<0.545	0.827	0.643	<0.545
77Se	0.337	1.1	6.5	5.4	6.5	5.8	7.3
88Sr	0.001	0.003	9.1	2.7	7.0	4.6	4.7
95Mo	0.005	0.017	0.397	0.254	0.342	0.372	0.392
107Ag	0.001	0.003	0.039	0.023	0.039	0.027	0.027
111Cd	0.114	0.380	5.1	3.4	8.0	6.2	3.9
118Sn	0.057	0.190	0.405	0.130	0.288	0.415	0.289
121Sb	0.004	0.013	0.058	0.030	0.068	0.037	0.047
137Ba	0.001	0.003	35	16	28	18	27
202Hg	0.021	0.070	0.110	0.115	0.146	0.104	0.092
205Tl	0.001	0.003	0.042	0.019	0.036	0.031	0.016
208Pb	0.002	0.007	0.373	0.120	0.313	0.129	0.220
238U	0.001	0.003	0.143	0.049	0.085	0.078	0.114

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LI24_INV-1_2022-05-02	RG_LI24_INV-2_2022-05-02	RG_LI24_INV-3_2022-05-02	RG_LI24_INV-4_2022-05-02	RG_LI24_INV-5_2022-05-02
		Lab ID	221	222	223	224	225
		Wet Weight (g)	1.8167	1.3315	1.6683	2.0050	0.9372
		Dry Weight (g)	0.2788	0.2349	0.2943	0.2895	0.1632
		Moisture (%)	84.7	82.4	82.4	85.6	82.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.003	0.010	0.295	0.302	0.179	0.195	0.387
11B	0.066	0.220	0.629	0.604	0.587	0.386	0.587
23Na	0.981	3.3	3,291	3,954	4,038	2,874	4,641
24Mg	0.017	0.057	1,757	1,297	1,244	1,577	1,760
27Al	0.017	0.057	145	165	88	75	142
31P	59	197	12,864	14,101	11,301	11,261	13,835
39K	2.2	7.3	10,208	13,895	11,824	9,521	14,225
44Ca	7.5	25	2,790	2,765	3,263	3,260	3,307
49Ti	0.209	0.697	10	9.9	6.3	4.2	9.9
51V	0.072	0.240	0.864	1.2	0.789	0.786	1.4
52Cr	0.195	0.650	2.7	2.4	2.2	2.0	2.5
55Mn	0.007	0.023	13	15	16	15	17
57Fe	0.859	2.9	125	133	125	112	166
59Co	0.005	0.017	0.305	0.417	0.517	0.362	0.509
60Ni	0.028	0.093	5.7	7.2	6.5	5.1	7.3
63Cu	0.009	0.030	13	12	12	14	15
66Zn	0.354	1.2	388	436	478	402	552
75As	0.545	1.8	1.7	1.5	2.0	1.5	1.9
77Se	0.337	1.1	5.4	7.2	7.1	6.1	7.2
88Sr	0.001	0.003	11	8.4	9.0	8.9	9.3
95Mo	0.005	0.017	0.297	0.277	0.251	0.352	0.327
107Ag	0.001	0.003	0.070	0.049	0.049	0.066	0.078
111Cd	0.114	0.380	1.8	2.2	2.2	2.4	2.6
118Sn	0.057	0.190	0.653	0.298	0.640	0.588	0.504
121Sb	0.004	0.013	0.036	0.037	0.029	0.023	0.042
137Ba	0.001	0.003	18	25	18	16	19
202Hg	0.021	0.070	0.073	0.092	0.115	0.096	0.104
205Tl	0.001	0.003	0.034	0.042	0.046	0.029	0.055
208Pb	0.002	0.007	0.088	0.140	0.142	0.088	0.189
238U	0.001	0.003	0.101	0.130	0.131	0.106	0.172

Notes:

ppm = parts per million

DL = detection limit

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LIDCOM_INV-1_2022-05-03	RG_LIDCOM_INV-2_2022-05-03	RG_LIDCOM_INV-3_2022-05-03	RG_LIDCOM_INV-4_2022-05-03	RG_LIDCOM_INV-5_2022-05-03
		Lab ID	226	227	228	229	230
		Wet Weight (g)	2.4330	2.1627	2.5910	3.2406	2.2363
		Dry Weight (g)	0.4523	0.5060	0.5492	0.5959	0.4707
		Moisture (%)	81.4	76.6	78.8	81.6	79.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.003	0.010	0.361	0.715	0.431	0.800	0.737
11B	0.066	0.220	1.5	2.1	1.4	2.8	2.9
23Na	0.981	3.3	1,975	2,323	2,816	3,205	2,858
24Mg	0.017	0.057	1,047	1,171	1,534	2,106	1,594
27Al	0.017	0.057	226	539	274	553	698
31P	59	197	6,294	9,702	10,672	11,767	9,573
39K	2.2	7.3	5,592	8,415	9,569	9,958	9,434
44Ca	7.5	25	1,532	2,896	2,062	4,434	3,897
49Ti	0.209	0.697	13	13	18	44	44
51V	0.072	0.240	0.360	0.437	0.398	0.973	1.1
52Cr	0.195	0.650	2.7	4.4	2.5	3.9	3.8
55Mn	0.007	0.023	58	73	182	106	165
57Fe	0.859	2.9	183	165	257	442	459
59Co	0.005	0.017	1.0	1.0	1.9	2.8	3.7
60Ni	0.028	0.093	13	11	21	22	21
63Cu	0.009	0.030	11	12	15	25	14
66Zn	0.354	1.2	254	244	390	574	443
75As	0.545	1.8	0.726	0.571	0.845	1.2	0.916
77Se	0.337	1.1	4.2	5.0	7.0	6.5	5.7
88Sr	0.001	0.003	2.6	3.4	3.2	6.5	6.1
95Mo	0.005	0.017	0.171	0.351	0.392	0.412	0.312
107Ag	0.001	0.003	0.015	0.024	0.032	0.049	0.029
111Cd	0.114	0.380	3.8	3.1	4.7	7.0	6.6
118Sn	0.057	0.190	0.267	0.186	0.250	0.459	0.319
121Sb	0.004	0.013	0.054	0.030	0.047	0.056	0.057
137Ba	0.001	0.003	11	12	20	27	40
202Hg	0.021	0.070	0.069	0.075	0.115	0.119	0.106
205Tl	0.001	0.003	0.032	0.027	0.032	0.038	0.032
208Pb	0.002	0.007	0.096	0.146	0.095	0.206	0.193
238U	0.001	0.003	0.031	0.036	0.055	0.096	0.103

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LIDSL_INV-1_2022-05-04	RG_LIDSL_INV-2_2022-05-04	RG_LIDSL_INV-3_2022-05-04	RG_LIDSL_INV-4_2022-05-04	RG_LIDSL_INV-5_2022-05-04
		Lab ID	231	232	233	234	235
		Wet Weight (g)	1.6296	2.2819	1.9062	1.8094	2.7918
		Dry Weight (g)	0.3564	0.5180	0.3829	0.3966	0.5538
		Moisture (%)	78.1	77.3	79.9	78.1	80.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.003	0.010	0.678	0.472	0.494	0.291	0.681
11B	0.066	0.220	1.8	1.5	2.0	0.687	2.2
23Na	0.981	3.3	3,424	2,831	2,683	1,690	3,516
24Mg	0.017	0.057	1,461	1,369	1,032	907	1,471
27Al	0.017	0.057	205	231	127	124	507
31P	59	197	10,874	10,647	9,546	6,949	11,556
39K	2.2	7.3	11,680	10,754	8,307	4,402	10,676
44Ca	7.5	25	1,735	2,524	1,292	1,716	2,543
49Ti	0.209	0.697	11	16	9.0	7.2	30
51V	0.072	0.240	0.456	0.555	0.374	0.295	1.1
52Cr	0.195	0.650	3.2	4.1	2.2	1.9	3.3
55Mn	0.007	0.023	177	203	119	154	351
57Fe	0.859	2.9	369	403	279	198	602
59Co	0.005	0.017	3.5	2.5	2.3	1.8	3.9
60Ni	0.028	0.093	22	22	11	11	35
63Cu	0.009	0.030	13	16	13	10	25
66Zn	0.354	1.2	296	324	274	251	607
75As	0.545	1.8	0.625	0.583	0.547	<0.545	0.743
77Se	0.337	1.1	4.3	4.7	4.8	3.6	6.7
88Sr	0.001	0.003	3.4	4.6	2.2	3.2	4.5
95Mo	0.005	0.017	0.362	0.342	0.382	0.282	0.503
107Ag	0.001	0.003	0.017	0.022	0.017	0.012	0.034
111Cd	0.114	0.380	5.3	5.8	4.0	4.0	6.8
118Sn	0.057	0.190	0.215	0.255	0.293	0.162	0.476
121Sb	0.004	0.013	0.060	0.059	0.052	0.025	0.082
137Ba	0.001	0.003	17	19	14	14	29
202Hg	0.021	0.070	0.073	0.071	0.073	0.054	0.145
205Tl	0.001	0.003	0.024	0.022	0.016	0.011	0.030
208Pb	0.002	0.007	0.091	0.075	0.074	0.052	0.200
238U	0.001	0.003	0.058	0.076	0.048	0.040	0.117

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LILC3_INV-1_2022-05-02	RG_LILC3_INV-2_2022-05-02	RG_LILC3_INV-3_2022-05-02	RG_LILC3_INV-4_2022-05-02	RG_LILC3_INV-5_2022-05-02
		Lab ID	236	237	238	239	240
		Wet Weight (g)	1.0036	1.9762	1.5452	1.6879	1.1729
		Dry Weight (g)	0.2060	0.4532	0.2093	0.3042	0.2225
		Moisture (%)	79.5	77.1	86.5	82.0	81.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.003	0.010	0.665	1.0	1.1	0.923	0.997
11B	0.066	0.220	1.4	3.6	1.5	0.912	2.3
23Na	0.981	3.3	2,661	2,871	3,116	5,050	2,934
24Mg	0.017	0.057	1,546	1,983	1,495	1,309	1,400
27Al	0.017	0.057	417	1,262	344	288	1,002
31P	59	197	9,999	10,132	10,980	11,140	10,223
39K	2.2	7.3	7,826	10,911	8,898	14,385	8,759
44Ca	7.5	25	3,024	5,316	2,738	1,834	6,425
49Ti	0.209	0.697	27	98	19	15	64
51V	0.072	0.240	1.2	3.2	1.0	0.836	2.4
52Cr	0.195	0.650	3.9	7.8	2.4	2.5	6.1
55Mn	0.007	0.023	380	793	446	466	702
57Fe	0.859	2.9	970	2,214	767	1,037	2,081
59Co	0.005	0.017	8.7	6.7	4.7	3.8	7.6
60Ni	0.028	0.093	24	58	24	21	52
63Cu	0.009	0.030	28	24	12	21	20
66Zn	0.354	1.2	545	296	270	225	361
75As	0.545	1.8	1.6	1.7	1.5	1.6	1.6
77Se	0.337	1.1	7.1	11	9.3	12	10
88Sr	0.001	0.003	5.4	10	4.7	3.2	9.5
95Mo	0.005	0.017	0.629	1.7	0.839	0.719	0.803
107Ag	0.001	0.003	0.037	0.048	0.024	0.032	0.054
111Cd	0.114	0.380	21	5.6	3.0	3.5	6.6
118Sn	0.057	0.190	0.556	1.1	0.740	0.567	1.0
121Sb	0.004	0.013	0.135	0.243	0.177	0.149	0.192
137Ba	0.001	0.003	32	74	32	31	75
202Hg	0.021	0.070	0.150	0.106	0.097	0.130	0.130
205Tl	0.001	0.003	0.050	0.050	0.036	0.040	0.054
208Pb	0.002	0.007	0.224	0.432	0.145	0.111	0.317
238U	0.001	0.003	0.131	0.316	0.123	0.129	0.200

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LISP24_INV-1_2022-05-03	RG_LISP24_INV-2_2022-05-03	RG_LISP24_INV-3_2022-05-03	RG_LISP24_INV-4_2022-05-03	RG_LISP24_INV-5_2022-05-03
		Lab ID	241	242	243	244	245
		Wet Weight (g)	1.8140	2.1666	2.1853	1.8584	2.3376
		Dry Weight (g)	0.3677	0.4081	0.4403	0.3583	0.4979
		Moisture (%)	79.7	81.2	79.9	80.7	78.7
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.003	0.010	0.505	0.628	0.447	0.665	0.405
11B	0.066	0.220	0.748	0.979	0.691	1.4	0.783
23Na	0.981	3.3	2,606	2,902	3,058	3,423	2,367
24Mg	0.017	0.057	909	1,540	1,752	1,095	1,169
27Al	0.017	0.057	109	202	176	318	105
31P	59	197	9,326	10,002	12,326	9,131	10,224
39K	2.2	7.3	9,078	7,787	8,800	9,734	8,275
44Ca	7.5	25	1,526	2,669	2,146	2,290	1,991
49Ti	0.209	0.697	8.4	11	10	19	6.2
51V	0.072	0.240	0.402	0.662	0.555	0.939	0.390
52Cr	0.195	0.650	2.4	3.0	2.2	3.0	3.2
55Mn	0.007	0.023	215	355	585	488	216
57Fe	0.859	2.9	270	633	448	604	345
59Co	0.005	0.017	2.5	4.5	4.3	4.8	1.9
60Ni	0.028	0.093	15	19	22	33	15
63Cu	0.009	0.030	17	27	21	21	14
66Zn	0.354	1.2	223	439	532	384	278
75As	0.545	1.8	<0.545	0.715	0.562	0.689	<0.545
77Se	0.337	1.1	5.5	6.5	7.0	5.8	5.9
88Sr	0.001	0.003	2.4	4.3	6.4	3.8	2.9
95Mo	0.005	0.017	0.270	0.419	0.479	0.570	0.259
107Ag	0.001	0.003	0.031	0.026	0.034	0.042	0.017
111Cd	0.114	0.380	2.4	7.8	7.8	6.9	3.5
118Sn	0.057	0.190	0.309	0.439	0.499	0.551	0.233
121Sb	0.004	0.013	0.058	0.062	0.058	0.052	0.043
137Ba	0.001	0.003	15	26	31	28	11
202Hg	0.021	0.070	0.077	0.126	0.121	0.126	0.096
205Tl	0.001	0.003	0.013	0.032	0.023	0.033	0.016
208Pb	0.002	0.007	0.124	0.094	0.114	0.116	0.045
238U	0.001	0.003	0.041	0.091	0.093	0.065	0.035

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_SLINE_INV-1_2022-05-03	RG_SLINE_INV-2_2022-05-03	RG_SLINE_INV-3_2022-05-03	RG_SLINE_INV-4_2022-05-03	RG_SLINE_INV-5_2022-05-03
		Lab ID	246	247	248	249	250
		Wet Weight (g)	1.5734	0.8357	1.2836	1.9576	2.5609
		Dry Weight (g)	0.2815	0.1582	0.2365	0.3833	0.4214
		Moisture (%)	82.1	81.1	81.6	80.4	83.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.003	0.010	0.484	0.585	0.373	0.554	0.412
11B	0.066	0.220	1.5	2.2	1.1	1.7	1.2
23Na	0.981	3.3	3,955	2,942	3,489	3,562	3,084
24Mg	0.017	0.057	1,769	1,572	1,502	1,176	1,200
27Al	0.017	0.057	636	809	332	812	523
31P	59	197	11,141	12,599	11,588	13,270	11,682
39K	2.2	7.3	12,147	11,234	10,478	11,349	10,343
44Ca	7.5	25	3,695	5,165	2,568	2,118	2,414
49Ti	0.209	0.697	41	58	20	56	35
51V	0.072	0.240	1.8	2.0	1.1	1.6	1.3
52Cr	0.195	0.650	4.7	11	3.1	3.8	3.1
55Mn	0.007	0.023	20	20	20	24	14
57Fe	0.859	2.9	353	493	209	315	248
59Co	0.005	0.017	0.882	0.492	0.479	0.246	0.298
60Ni	0.028	0.093	9.6	17	6.2	5.2	5.5
63Cu	0.009	0.030	22	19	16	13	16
66Zn	0.354	1.2	844	468	583	228	291
75As	0.545	1.8	1.9	1.7	1.6	0.696	1.3
77Se	0.337	1.1	8.5	6.9	9.1	6.5	6.8
88Sr	0.001	0.003	9.9	11	6.4	5.9	5.1
95Mo	0.005	0.017	0.440	0.518	0.324	0.654	0.375
107Ag	0.001	0.003	0.123	0.112	0.095	0.082	0.091
111Cd	0.114	0.380	8.4	2.6	5.9	0.936	2.5
118Sn	0.057	0.190	0.349	0.701	0.377	0.229	0.448
121Sb	0.004	0.013	0.026	0.034	0.022	0.029	0.018
137Ba	0.001	0.003	22	31	14	43	24
202Hg	0.021	0.070	0.197	0.141	0.156	0.111	0.116
205Tl	0.001	0.003	0.069	0.043	0.084	0.046	0.048
208Pb	0.002	0.007	0.211	0.225	0.127	0.220	0.137
238U	0.001	0.003	0.130	0.163	0.122	0.123	0.064

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_FO23_INV-5_2022-05-04			RG_LI8_INV-3_2022-05-04			RG_LIDCOM_INV-2_2022-05-03		
Lab ID		205			218			227		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.003	2.8	1.9	38	0.682	0.856	23	0.715	0.704	1.6
11B	0.066	9.7	7.1	31	2.8	3.4	19	2.1	2.7	25
23Na	0.981	3,117	3,230	3.6	2,807	2,728	2.9	2,323	2,217	4.7
24Mg	0.017	2,236	2,297	2.7	1,977	1,811	8.8	1,171	805	37
27Al	0.017	4,167	4,216	1.2	663	768	15	539	584	8.0
31P	59	11,217	13,270	17	11,077	10,669	3.8	9,702	6,648	37
39K	2.2	14,590	12,226	18	8,761	9,966	13	8,415	6,088	32
44Ca	7.5	14,194	8,699	48	4,883	5,975	20	2,896	1,969	38
49Ti	0.209	275	317	14	40	46	14	13	14	7.4
51V	0.072	7.3	6.8	7.1	1.1	1.2	8.7	0.437	0.435	-
52Cr	0.195	40	42	4.9	5.6	4.9	13	4.4	3.1	35
55Mn	0.007	67	67	0.0	100	80	22	73	64	13
57Fe	0.859	2,193	1,719	24	422	418	1.0	165	218	28
59Co	0.005	3.2	3.1	3.2	1.8	1.3	32	1.0	1.0	0.0
60Ni	0.028	58	55	5.3	30	30	0.0	11	13	17
63Cu	0.009	21	20	4.9	21	21	0.0	12	10	18
66Zn	0.354	376	476	24	645	472	31	244	221	9.9
75As	0.545	1.7	1.1	-	0.827	1.0	-	0.571	<0.545	-
77Se	0.337	8.7	8.3	4.7	6.5	5.6	15	5.0	4.5	11
88Sr	0.001	15	12	22	7.0	8.2	16	3.4	2.9	16
95Mo	0.005	0.588	0.429	31	0.342	0.382	11	0.351	0.272	25
107Ag	0.001	0.168	0.131	25	0.039	0.049	23	0.024	0.020	18
111Cd	0.114	2.3	2.6	12	8.0	5.4	39	3.1	2.6	18
118Sn	0.057	0.725	0.605	18	0.288	0.333	-	0.186	0.158	-
121Sb	0.004	0.149	0.106	34	0.051	0.068	29	0.030	0.042	33
137Ba	0.001	92	88	4.4	28	32	13	12	12	0.0
202Hg	0.021	0.096	0.108	-	0.146	0.108	-	0.075	0.104	-
205Tl	0.001	0.059	0.055	7.0	0.036	0.041	13	0.027	0.028	3.6
208Pb	0.002	1.5	1.2	22	0.313	0.293	6.6	0.146	0.124	16
238U	0.001	0.192	0.183	4.8	0.085	0.119	33	0.036	0.038	5.4

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_LIDSL_INV-1_2022-05-04			RG_LIDSL_INV-5_2022-05-04		
Lab ID		231			235		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.003	0.678	0.671	1.0	0.681	0.624	8.7
11B	0.066	1.8	1.9	5.4	2.2	1.8	20
23Na	0.981	3,424	4,131	19	3,516	3,178	10
24Mg	0.017	1,461	1,573	7.4	1,471	1,520	3.3
27Al	0.017	205	241	16	507	440	14
31P	59	10,874	11,734	7.6	11,556	10,098	14
39K	2.2	11,680	12,560	7.3	10,676	8,328	25
44Ca	7.5	1,735	2,078	18	2,543	2,683	5.4
49Ti	0.209	11	15	31	30	24	22
51V	0.072	0.456	0.566	-	1.1	1.0	9.5
52Cr	0.195	3.2	3.7	15	3.3	2.9	13
55Mn	0.007	177	257	37	351	262	29
57Fe	0.859	369	371	0.5	602	600	0.3
59Co	0.005	3.5	4.5	25	3.9	4.1	5.0
60Ni	0.028	22	29	28	35	26	30
63Cu	0.009	13	17	27	25	22	13
66Zn	0.354	296	377	24	607	439	32
75As	0.545	0.625	0.845	-	0.743	0.736	-
77Se	0.337	4.3	5.1	17	6.7	6.4	4.6
88Sr	0.001	3.4	3.7	8.5	4.5	5.8	25
95Mo	0.005	0.362	0.473	27	0.503	0.407	21
107Ag	0.001	0.017	0.020	16	0.034	0.027	23
111Cd	0.114	5.3	7.8	38	6.8	6.7	1.5
118Sn	0.057	0.215	0.352	-	0.476	0.433	-
121Sb	0.004	0.060	0.067	11	0.082	0.090	9.3
137Ba	0.001	17	21	21	29	31	6.7
202Hg	0.021	0.073	0.111	-	0.145	0.099	-
205Tl	0.001	0.024	0.032	29	0.030	0.028	6.9
208Pb	0.002	0.091	0.090	1.1	0.200	0.263	27
238U	0.001	0.058	0.064	9.8	0.117	0.091	25

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

		Sample Group ID	01			02		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.003	1.21	1.2	96	7.7	1.4	114	3.2
11B	0.066	4.5	5.1	112	4.5	4.9	110	4.7
23Na	0.981	14,000	16,120	115	7.5	14,154	101	3.6
24Mg	0.017	910	1,002	110	7.8	989	109	2.8
27Al	0.017	197.2	215	109	8.2	180	91	4.6
31P	59	8,000	8,898	111	5.5	7,624	95	3.8
39K	2.2	15,500	17,359	112	9.7	15,647	101	4.2
44Ca	7.5	2,360	2,549	108	4.8	2,410	102	3.2
49Ti	0.209	12.24	14	116	18	12	101	9.2
51V	0.072	1.57	1.8	115	7.9	1.5	93	10
52Cr	0.195	1.87	2.3	121	7.4	1.9	100	6.1
55Mn	0.007	3.17	3.6	113	7.8	3.3	104	3.7
57Fe	0.859	343	387	113	5.4	344	100	3.8
59Co	0.005	0.25	0.310	124	7.7	0.258	103	4.9
60Ni	0.028	1.34	1.6	121	9.2	1.4	103	6.1
63Cu	0.009	15.7	19	122	6.8	16	104	5.5
66Zn	0.354	51.6	57	111	5.3	50	96	4.6
75As	0.545	6.87	7.8	114	5.4	6.6	97	4.2
77Se	0.337	3.45	3.7	106	3.1	3.5	101	3.5
88Sr	0.001	10.1	12	115	4.7	10	100	5.4
95Mo	0.005	0.29	0.320	110	5.9	0.298	103	6.1
107Ag	0.001	0.0252	0.031	121	8.5	0.024	96	7.4
111Cd	0.114	0.299	0.361	121	7.0	0.316	106	9.7
118Sn	0.057	0.061	0.062	101	1.1	0.063	104	7.9
121Sb	0.004	0.011	0.012	107	7.1	0.012	109	12
137Ba	0.001	8.6	9.6	112	4.2	8.5	99	1.7
202Hg	0.021	0.412	0.447	108	5.0	0.422	102	7.9
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.002	0.404	0.485	120	10	0.351	87	8.8
238U	0.001	0.05	0.050	101	11	0.044	88	5.9

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	03			04	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.003	1.21	1.2	102	9.2	1.1	93	7.5
11B	0.066	4.5	4.1	91	3.6	4.6	102	2.8
23Na	0.981	14,000	14,180	101	7.4	12,988	93	2.6
24Mg	0.017	910	935	103	6.0	857	94	6.2
27Al	0.017	197.2	178	90	1.3	199	101	8.2
31P	59	8,000	8,013	100	3.6	7,679	96	4.9
39K	2.2	15,500	14,956	96	3.7	15,056	97	8.4
44Ca	7.5	2,360	2,359	100	4.6	2,208	94	3.5
49Ti	0.209	12.24	11	87	9.4	13	105	6.5
51V	0.072	1.57	1.7	106	11	1.6	103	12
52Cr	0.195	1.87	1.9	100	5.8	1.9	100	4.5
55Mn	0.007	3.17	3.4	108	4.9	3.0	95	4.3
57Fe	0.859	343	356	104	4.6	329	96	5.1
59Co	0.005	0.25	0.258	103	7.9	0.245	98	5.8
60Ni	0.028	1.34	1.4	104	5.1	1.4	102	4.0
63Cu	0.009	15.7	16	102	6.2	16	104	7.0
66Zn	0.354	51.6	51	99	7.6	50	98	3.6
75As	0.545	6.87	7.1	103	4.7	6.6	96	4.1
77Se	0.337	3.45	3.5	101	6.6	3.5	101	5.3
88Sr	0.001	10.1	10	101	7.2	9.7	96	8.6
95Mo	0.005	0.29	0.298	103	4.4	0.286	99	6.1
107Ag	0.001	0.0252	0.028	110	7.1	0.025	98	7.2
111Cd	0.114	0.299	0.309	103	16	0.337	113	7.5
118Sn	0.057	0.061	0.070	115	13	0.058	95	15
121Sb	0.004	0.011	0.010	89	17	0.010	94	11
137Ba	0.001	8.6	7.6	89	3.5	8.6	100	3.4
202Hg	0.021	0.412	0.442	107	9.2	0.426	103	6.9
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.002	0.404	0.451	112	15	0.449	111	18
238U	0.001	0.05	0.052	104	7.8	0.049	99	12

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_FO23_INV-1_2022-05-04	201	16 May 2022
	RG_FO23_INV-2_2022-05-04	202	
	RG_FO23_INV-3_2022-05-04	203	
	RG_FO23_INV-4_2022-05-04	204	
	RG_FO23_INV-5_2022-05-04	205	
	RG_FRUL_INV-1_2022-05-02	206	
	RG_FRUL_INV-2_2022-05-02	207	
	RG_FRUL_INV-3_2022-05-02	208	
	RG_FRUL_INV-4_2022-05-02	209	
	RG_FRUL_INV-5_2022-05-02	210	
	RG_LCUT_INV-1_2022-05-02	211	
	RG_LCUT_INV-2_2022-05-02	212	
	RG_LCUT_INV-3_2022-05-02	213	
	RG_LCUT_INV-4_2022-05-02	214	
	RG_LCUT_INV-5_2022-05-02	215	
	RG_LI8_INV-1_2022-05-04	216	
	RG_LI8_INV-2_2022-05-04	217	
02	RG_LI8_INV-3_2022-05-04	218	16 May 2022
	RG_LI8_INV-4_2022-05-04	219	
	RG_LI8_INV-5_2022-05-04	220	
	RG_LI24_INV-1_2022-05-02	221	
	RG_LI24_INV-2_2022-05-02	222	
	RG_LI24_INV-3_2022-05-02	223	
	RG_LI24_INV-4_2022-05-02	224	
	RG_LI24_INV-5_2022-05-02	225	
	RG_LIDCOM_INV-1_2022-05-03	226	
	RG_LIDCOM_INV-2_2022-05-03	227	
	RG_LIDCOM_INV-3_2022-05-03	228	
	RG_LIDCOM_INV-4_2022-05-03	229	
	RG_LIDCOM_INV-5_2022-05-03	230	
	RG_LIDSL_INV-1_2022-05-04	231	
	RG_LIDSL_INV-2_2022-05-04	232	
	RG_LIDSL_INV-3_2022-05-04	233	
	RG_LIDSL_INV-4_2022-05-04	234	
03	RG_LIDSL_INV-5_2022-05-04	235	16 May 2022
	RG_LILC3_INV-1_2022-05-02	236	
	RG_LILC3_INV-2_2022-05-02	237	
	RG_LILC3_INV-3_2022-05-02	238	
	RG_LILC3_INV-4_2022-05-02	239	
	RG_LILC3_INV-5_2022-05-02	240	

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
03	RG_LISP24_INV-1_2022-05-03	241	16 May 2022
	RG_LISP24_INV-2_2022-05-03	242	
	RG_LISP24_INV-3_2022-05-03	243	
04	RG_LISP24_INV-4_2022-05-03	244	16 May 2022
	RG_LISP24_INV-5_2022-05-03	245	
	RG_SLINE_INV-1_2022-05-03	246	
	RG_SLINE_INV-2_2022-05-03	247	
	RG_SLINE_INV-3_2022-05-03	248	
	RG_SLINE_INV-4_2022-05-03	249	
	RG_SLINE_INV-5_2022-05-03	250	

MINNOW ENVIRONMENTAL INCORPORATED

204-1006 Fort Street
Victoria, British Columbia V8V 3K4
Telephone:(250) 595-1627
Facsmile:(250) 595-1625

CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Minnow Contact: Tyler Mehler
Contact Email: tyler.mehler@minnow.ca
Minnow Project #: 217202.0036
Date Results Required By:

Contact: Tyler Mehler
Phone: 587-597-1612 Fax:
Report mailing list: tyler.mehler@minnow.ca; Cybele.Heddle@teck.com; Kbatchelar@minnow.ca, Jessica.Ritz@teck.com

CA ID	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Moisture (Freeze Drying)	Full Metals including Hg	Number of Containers	Comments
201	1	RG_FO23_INV-1_2022-05-04	04-May-22	Invertebrate tissue	x	x	1	
202	2	RG_FO23_INV-2_2022-05-04	04-May-22	Invertebrate tissue	x	x	1	
203	3	RG_FO23_INV-3_2022-05-04	04-May-22	Invertebrate tissue	x	x	1	
204	4	RG_FO23_INV-4_2022-05-04	04-May-22	Invertebrate tissue	x	x	1	
205	5	RG_FO23_INV-5_2022-05-04	04-May-22	Invertebrate tissue	x	x	1	
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							

Analysis Required

Project # 217 331

Samples Relinquished to Lab By: KS Date: 2022-05-13 Time: 08:00
(Minnow Employee Signature)

Samples Received in Lab By: Alex Wade Date: 5 May 2022 Time: 10:00
(Lab Employee Signature)

Shipment Method: Pacific Coastal cargo in iced cooler

Sample Condition upon Receipt: Frozen

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED

204-1006 Fort Street
Victoria, British Columbia V8V 3K4
Telephone:(250) 595-1627
Facsmile:(250) 595-1625

CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Tyler Mehler
Phone: 587-597-1612 Fax:

Minnow Contact: Tyler Mehler
Contact Email: tyler.mehler@minnow.ca
Minnow Project #: 217202.0036
Date Results Required By:

Report mailing list: tyler.mehler@minnow.ca; Cybele.Heddle@teck.com; Kbatchelar@minnow.ca, Jessica.Ritz@teck.com

Trich ID	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Analysis Required: Full Metals including Hg	Analysis Required	Analysis Required	Analysis Required	Number of Containers	Comments
206	1	RG_FRUL_INV-1_2022-05-02 ✓	02-May-22	Invertebrate tissue	x	x				1	
207	2	RG_FRUL_INV-2_2022-05-02 ✓	02-May-22	Invertebrate tissue	x	x				1	
208	3	RG_FRUL_INV-3_2022-05-02 ✓	02-May-22	Invertebrate tissue	x	x				1	
209	4	RG_FRUL_INV-4_2022-05-02 ✓	02-May-22	Invertebrate tissue	x	x				1	
210	5	RG_FRUL_INV-5_2022-05-02 ✓	02-May-22	Invertebrate tissue	x	x				1	
	6										
	7										
	8										
	9										
	10										Project #: 2022-331
	11										
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) — Date: 2022-05-13 — Time: 08:00 — Shipment Method: Pacific Coastal cargo in iced cooler

Samples Received in Lab By: Alex Wade (Lab Employee Signature) — Date: 16 May 2022 — Time: 10:00 — Sample Condition upon Receipt: Frozen

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED

204-1006 Fort Street
Victoria, British Columbia V8V 3K4
Telephone:(250) 595-1627
Facsmile:(250) 595-1625

CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Minnow Contact: Tyler Mehler
Contact Email: tyler.mehler@minnow.ca
Minnow Project #: 217202.0036
Date Results Required By:

Contact: Tyler Mehler
Phone: 587-597-1612 Fax:
Report mailing list: tyler.mehler@minnow.ca; Cybele.Heddle@teck.com; Kbatchelar@minnow.ca, Jessica.Ritz@teck.com

Trich ID	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Analysis Required: Full Metals including Hg	Number of Containers	Comments
211	1	RG_LCUT_INV-1_2022-05-02	02-May-22	Invertebrate tissue	x	x	1	
212	2	RG_LCUT_INV-2_2022-05-02	02-May-22	Invertebrate tissue	x	x	1	
213	3	RG_LCUT_INV-3_2022-05-02	02-May-22	Invertebrate tissue	x	x	1	
214	4	RG_LCUT_INV-4_2022-05-02	02-May-22	Invertebrate tissue	x	x	1	
215	5	RG_LCUT_INV-5_2022-05-02	02-May-22	Invertebrate tissue	x	x	1	
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							

Project # 2022 331

Samples Relinquished to Lab By: [signature]
(Minnow Employee Signature)
Date: 2022-05-13 Time: 08:00

Samples Received in Lab By: Alex Wade [signature]
(Lab Employee Signature)
Date: 15 May 2022 Time: 10:00

Shipment Method: Pacific Coastal cargo in iced cooler

Sample Condition upon Receipt: Frozen

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED

204-1006 Fort Street
Victoria, British Columbia V8V 3K4
Telephone:(250) 595-1627
Facsmile:(250) 595-1625

CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Tyler Mehler
Phone: 587-597-1612 Fax:

Minnow Contact: Tyler Mehler
Contact Email: tyler.mehler@minnow.ca
Minnow Project #: 217202.0036
Date Results Required By:

Report mailing list: tyler.mehler@minnow.ca; Cybele.Heddle@teck.com; Kbatchelar@minnow.ca, Jessica.Ritz@teck.com

					Analysis Required						
Trich ID	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Moisture (Freeze Drying)	Full Metals including Hg				Number of Containers	Comments
216	1	RG_LI8_INV-1_2022-05-04 ✓	04-May-22	Invertebrate tissue	x	x				1	
217	2	RG_LI8_INV-2_2022-05-04 ✓	04-May-22	Invertebrate tissue	x	x				1	
218	3	RG_LI8_INV-3_2022-05-04 ✓	04-May-22	Invertebrate tissue	x	x				1	
219	4	RG_LI8_INV-4_2022-05-04 ✓	04-May-22	Invertebrate tissue	x	x				1	
220	5	RG_LI8_INV-5_2022-05-04 ✓	04-May-22	Invertebrate tissue	x	x				1	
	6										
	7										
	8										
	9										
	10										
	11										Project # 2022-331
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature)	Date: 2022-05-13	Time: 08:00	Shipment Method: Pacific Coastal cargo in iced cooler
Samples Received in Lab By: Alex Wade (Lab Employee Signature)	Date: 5 May 2022	Time: 10:00	Sample Condition upon Receipt: Frozen

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED	CHAIN OF CUSTODY RECORD
204-1006 Fort Street Victoria, British Columbia V8V 3K4 Telephone:(250) 595-1627 Facsmile:(250) 595-1625	

Laboratory: Trich Analytics

Minnow Contact: Tyler Mehler
Contact Email: tyler.mehler@minnow.ca
Minnow Project #: 217202.0036
Date Results Required By:

Contact: Tyler Mehler
Phone: 587-597-1612 Fax:
Report mailing list: tyler.mehler@minnow.ca; Cybele.Heddle@teck.com; Kbatchelar@minnow.ca, Jessica.Ritz@teck.com

Trich ID	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Analysis Required: Full Metals including Hg	Number of Containers	Comments
221	1	RG_LI24_INV-1_2022-05-02 *	02-May-22	Invertebrate tissue	x	x	1	
222	2	RG_LI24_INV-2_2022-05-02 *	02-May-22	Invertebrate tissue	x	x	1	
223	3	RG_LI24_INV-3_2022-05-02 *	02-May-22	Invertebrate tissue	x	x	1	
224	4	RG_LI24_INV-4_2022-05-02 *	02-May-22	Invertebrate tissue	x	x	1	
225	5	RG_LI24_INV-5_2022-05-02 *	02-May-22	Invertebrate tissue	x	x	1	
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							

Project # 2022 331

Samples Relinquished to Lab By: (Minnow Employee Signature) — Date: 2022-05-13 Time: 08:00

Samples Received in Lab By: (Lab Employee Signature) Alex Wade — Date: 15 May 2022 Time: 10:00

Shipment Method: Pacific Coastal cargo in iced cooler

Sample Condition upon Receipt: Frozen

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

* Sample container dates read "2022-05-03". aw 15 May 2022

MINNOW ENVIRONMENTAL INCORPORATED	CHAIN OF CUSTODY RECORD
204-1006 Fort Street Victoria, British Columbia V8V 3K4 Telephone:(250) 595-1627 Facsmile:(250) 595-1625	

Laboratory: Trich Analytics

Minnow Contact: Tyler Mehler
Contact Email: tyler.mehler@minnow.ca
Minnow Project #: 217202.0036
Date Results Required By:

Contact: Tyler Mehler
Phone: 587-597-1612 Fax:

Report mailing list: tyler.mehler@minnow.ca; Cybele.Heddle@teck.com; Kbatchelar@minnow.ca, Jessica.Ritz@teck.com

Trich ID	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Analysis Required: Full Metals including Hg	Analysis Required	Analysis Required	Analysis Required	Number of Containers	Comments
226	1	RG_LIDCOM_INV-1_2022-05-03 *	03-May-22	Invertebrate tissue	x	x				1	
227	2	RG_LIDCOM_INV-2_2022-05-03 *	03-May-22	Invertebrate tissue	x	x				1	
228	3	RG_LIDCOM_INV-3_2022-05-03 *	03-May-22	Invertebrate tissue	x	x				1	
229	4	RG_LIDCOM_INV-4_2022-05-03 *	03-May-22	Invertebrate tissue	x	x				1	
230	5	RG_LIDCOM_INV-5_2022-05-03 *	03-May-22	Invertebrate tissue	x	x				1	
	6										
	7										
	8										
	9										
	10										
	11										Project #: 2022-331
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature)	Date: 2022-05-13	Time: 08:00	Shipment Method: Pacific Coastal cargo in iced cooler
Samples Received in Lab By: (Lab Employee Signature) Alex Wade	Date: 15 May 2022	Time: 10:00	Sample Condition upon Receipt: Frozen

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

* Sample containers read "22/05/04".
aw 15may2022

MINNOW ENVIRONMENTAL INCORPORATED	CHAIN OF CUSTODY RECORD
204-1006 Fort Street Victoria, British Columbia V8V 3K4 Telephone:(250) 595-1627 Facsmile:(250) 595-1625	

Laboratory: Trich Analytics

Minnow Contact: Tyler Mehler
Contact Email: tyler.mehler@minnow.ca
Minnow Project #: 217202.0036
Date Results Required By:

Contact: Tyler Mehler
Phone: 587-597-1612 Fax:
Report mailing list: tyler.mehler@minnow.ca: Cybele.Heddle@teck.com; Kbatchelar@minnow.ca, Jessica.Ritz@teck.com

Teck ID	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Moisture (Freeze Drying)	Full Metals including Hg	Number of Containers	Comments
					Analysis Required			
231	1	RG_LIDSL_INV-1_2022-05-04	04-May-22	Invertebrate tissue	x	x	1	
232	2	RG_LIDSL_INV-2_2022-05-04	04-May-22	Invertebrate tissue	x	x	1	
233	3	RG_LIDSL_INV-3_2022-05-04	04-May-22	Invertebrate tissue	x	x	1	
234	4	RG_LIDSL_INV-4_2022-05-04	04-May-22	Invertebrate tissue	x	x	1	
235	5	RG_LIDSL_INV-5_2022-05-04	04-May-22	Invertebrate tissue	x	x	1	
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							

Project # 2022-331

Samples Relinquished to Lab By: (Minnow Employee Signature) Date: 2022-05-13 Time: 08:00

Samples Received in Lab By: Alex Wade (Lab Employee Signature) Date: 13 May 2022 Time: 10:00

Shipment Method: Pacific Coastal cargo in iced cooler

Sample Condition upon Receipt: Frozen

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED

204-1006 Fort Street
Victoria, British Columbia V8V 3K4
Telephone:(250) 595-1627
Facsmile:(250) 595-1625

CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Minnow Contact: Tyler Mehler
Contact Email: tyler.mehler@minnow.ca
Minnow Project #: 217202.0036
Date Results Required By:

Contact: Tyler Mehler
Phone: 587-597-1612 Fax:

Report mailing list: tyler.mehler@minnow.ca; Cybele.Heddle@teck.com; Kbatchelar@minnow.ca, Jessica.Ritz@teck.com

Trich ID	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Analysis Required: Full Metals including Hg	Analysis Required	Analysis Required	Analysis Required	Number of Containers	Comments
236	1	RG_LILC3_INV-1_2022-05-03*	02-May-22	Invertebrate tissue	x	x				1	
237	2	RG_LILC3_INV-2_2022-05-03*	02-May-22	Invertebrate tissue	x	x				1	
238	3	RG_LILC3_INV-3_2022-05-03*	02-May-22	Invertebrate tissue	x	x				1	
239	4	RG_LILC3_INV-4_2022-05-03*	02-May-22	Invertebrate tissue	x	x				1	
240	5	RG_LILC3_INV-5_2022-05-03*	02-May-22	Invertebrate tissue	x	x				1	
	6										
	7										
	8										
	9										
	10										
	11										Project #: 2022-331
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) Rick Smit	Date: 2022-05-13	Time: 08:00	Shipment Method: Pacific Coastal cargo in iced cooler
Samples Received in Lab By: (Lab Employee Signature) Alex Wade	Date: 15 May 2022	Time: 10:00	Sample Condition upon Receipt: Frozen

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

* Sample containers read "2022-05-02".
aw 15 May 2022

MINNOW ENVIRONMENTAL INCORPORATED	CHAIN OF CUSTODY RECORD
204-1006 Fort Street Victoria, British Columbia V8V 3K4 Telephone:(250) 595-1627 Facsmile:(250) 595-1625	

Laboratory: Trich Analytics

Minnow Contact: Tyler Mehler
Contact Email: tyler.mehler@minnow.ca
Minnow Project #: 217202.0036
Date Results Required By:

Contact: Tyler Mehler
Phone: 587-597-1612 Fax:
Report mailing list: tyler.mehler@minnow.ca; Cybele.Heddle@teck.com; Kbatchelar@minnow.ca, Jessica.Ritz@teck.com

TrcLID	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Moisture (Freeze Drying)	Full Metals including Hg	Number of Containers	Comments
241	1	RG_LISP24_INV-1_2022-05-03	03-May-22	Invertebrate tissue	x	x	1	
242	2	RG_LISP24_INV-2_2022-05-03	03-May-22	Invertebrate tissue	x	x	1	
243	3	RG_LISP24_INV-3_2022-05-03	03-May-22	Invertebrate tissue	x	x	1	
244	4	RG_LISP24_INV-4_2022-05-03	03-May-22	Invertebrate tissue	x	x	1	
245	5	RG_LISP24_INV-5_2022-05-03	03-May-22	Invertebrate tissue	x	x	1	
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							

Project # 1022 331

Samples Relinquished to Lab By: Ricle Smit
(Minnow Employee Signature)
Date: 2022-05-13 Time: 08:00

Samples Received in Lab By: Alex Wade
(Lab Employee Signature)
Date: 13 may 2022 Time: 10:00

Shipment Method: Pacific Coastal cargo in iced cooler

Sample Condition upon Receipt: Frozen

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED

204-1006 Fort Street
Victoria, British Columbia V8V 3K4
Telephone:(250) 595-1627
Facsmile:(250) 595-1625

CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Tyler Mehler
Phone: 587-597-1612 Fax:

Minnow Contact: Tyler Mehler
Contact Email: tyler.mehler@minnow.ca
Minnow Project #: 217202.0036
Date Results Required By:

Report mailing list: tyler.mehler@minnow.ca; Cybele.Heddle@teck.com; Kbatchelar@minnow.ca, Jessica.Ritz@teck.com

					Analysis Required						
Trich ID	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Moisture (Freeze Drying)	Full Metals including Hg				Number of Containers	Comments
246	1	RG_SLINE_INV-1_2022-05-03 ✓	03-May-22	Invertebrate tissue	x	x				1	
247	2	RG_SLINE_INV-2_2022-05-03 ✓	03-May-22	Invertebrate tissue	x	x				1	
248	3	RG_SLINE_INV-3_2022-05-03 ✓	03-May-22	Invertebrate tissue	x	x				1	
249	4	RG_SLINE_INV-4_2022-05-03 ✓	03-May-22	Invertebrate tissue	x	x				1	
250	5	RG_SLINE_INV-5_2022-05-03 ✓	03-May-22	Invertebrate tissue	x	x				1	
	6										
	7										
	8										
	9										
	10										
	11										Project #: 2022-331
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: Rick Smit (Minnow Employee Signature) — Date: 2022-05-13 — Time: 08:00 — Shipment Method: Pacific Coastal cargo in iced cooler

Samples Received in Lab By: Alex Wade (Lab Employee Signature) — Date: 13 may 2022 — Time: 10:00 — Sample Condition upon Receipt: Frozen

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

BENTHIC TISSUE CHEMISTRY

TrichAnalytics Laboratory Report 2022-364

(Finalized August 8, 2022)

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Cybele Heddle
Project Manager
Teck
Phone: (250) 910-8755
Email: cybele.heddle@teck.com; tyler.mehler@minnow.ca; jessica.ritz@teck.com; hannah.penner@teck.com; kbatchelar@minnow.ca

Date Received:	02 Aug 2022
Date of Analysis:	05 Aug 2022
Final Report Date:	08 Aug 2022
Project No.:	2022-364
Method No.:	MET-002.06

Client Project: LCO LAEMP Regional Effects Program (PO 818999)

Analytical Request: Composite Benthic Invertebrate Tissue Microchemistry (total metals & moisture) - 50 samples.
See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in parts per million (ppm) dry weight (equivalent to mg/kg).
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
Client specific DQO for Selenium accuracy is 90-110% of the certified value; result achieved 107% (ranging from 104-109%).

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio — 08 Aug 2022 (Date)

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Teck

Tissue Analysis Results

		Client ID	RG_LISP24_INV-1_2022-07-13_N	RG_LISP24_INV-2_2022-07-13_N	RG_LISP24_INV-3_2022-07-13_N	RG_LISP24_INV-4_2022-07-13_N	RG_LISP24_INV-5_2022-07-13_N
		Lab ID	001	002	003	004	005
		Wet Weight (g)	1.2089	1.4891	2.3637	1.6316	2.0446
		Dry Weight (g)	0.1939	0.2531	0.4575	0.2750	0.4027
		Moisture (%)	84.0	83.0	80.6	83.1	80.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.016	0.053	0.768	0.726	0.594	0.716	0.482
11B	0.070	0.233	1.1	0.914	0.822	1.2	0.457
23Na	6.1	20	4,108	4,997	4,567	2,992	3,998
24Mg	0.126	0.420	2,333	2,133	2,180	2,205	1,868
27Al	0.049	0.163	473	392	271	462	200
31P	112	373	16,862	17,235	15,456	13,709	14,635
39K	2.5	8.3	15,617	15,601	13,948	10,483	13,120
44Ca	10	33	4,124	3,702	3,620	3,734	2,384
49Ti	0.001	0.003	49	27	16	31	13
51V	0.032	0.107	1.2	0.830	0.597	0.915	0.495
52Cr	0.204	0.680	7.6	6.0	4.4	5.5	3.1
55Mn	0.009	0.030	101	91	115	198	109
57Fe	1.7	5.7	539	411	383	416	225
59Co	0.013	0.043	8.4	8.4	14	9.3	8.2
60Ni	0.053	0.177	28	26	35	25	20
63Cu	0.018	0.060	42	41	37	35	36
66Zn	0.374	1.2	907	755	952	815	877
75As	0.355	1.2	2.7	2.5	3.1	2.4	2.8
77Se	0.394	1.3	7.2	7.2	6.8	6.5	6.9
88Sr	0.001	0.003	7.1	5.7	5.6	6.9	4.3
95Mo	0.001	0.003	0.746	0.725	0.684	0.787	0.435
107Ag	0.001	0.003	0.104	0.094	0.073	0.063	0.052
111Cd	0.162	0.540	21	19	22	18	19
118Sn	0.046	0.153	1.9	0.677	0.678	0.755	0.603
121Sb	0.004	0.013	0.037	0.040	0.035	0.046	0.028
137Ba	0.001	0.003	28	23	18	36	17
202Hg	0.020	0.067	0.155	0.119	0.137	0.135	0.151
205Tl	0.001	0.003	0.118	0.084	0.108	0.088	0.129
208Pb	0.002	0.007	0.243	0.170	0.154	0.233	0.110
238U	0.001	0.003	0.163	0.072	0.085	0.101	0.078

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck

Tissue Analysis Results

		Client ID	RG_LIDSL_INV-1_2022-07-11_N	RG_LIDSL_INV-2_2022-07-11_N	RG_LIDSL_INV-3_2022-07-11_N	RG_LIDSL_INV-4_2022-07-11_N	RG_LIDSL_INV-5_2022-07-11_N
		Lab ID	006	007	008	009	010
		Wet Weight (g)	1.5613	1.6903	1.8220	1.6341	1.4403
		Dry Weight (g)	0.2780	0.3367	0.3234	0.2910	0.2563
		Moisture (%)	82.2	80.1	82.3	82.2	82.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.016	0.053	0.639	0.411	0.771	0.578	0.494
11B	0.070	0.233	0.792	0.563	0.887	0.883	0.670
23Na	6.1	20	4,448	2,900	3,947	3,708	3,529
24Mg	0.126	0.420	1,925	1,369	2,232	1,821	1,881
27Al	0.049	0.163	390	159	629	425	252
31P	112	373	13,989	11,463	15,311	11,905	13,821
39K	2.5	8.3	14,699	9,670	13,050	11,616	11,812
44Ca	10	33	3,319	1,933	3,951	2,923	3,861
49Ti	0.001	0.003	23	9.5	42	29	20
51V	0.032	0.107	0.802	0.377	1.4	0.912	0.540
52Cr	0.204	0.680	4.7	2.3	8.6	5.6	4.0
55Mn	0.009	0.030	118	72	94	94	118
57Fe	1.7	5.7	375	191	491	402	278
59Co	0.013	0.043	8.9	5.7	8.4	7.2	12
60Ni	0.053	0.177	22	12	26	19	24
63Cu	0.018	0.060	29	22	32	27	35
66Zn	0.374	1.2	898	707	855	624	912
75As	0.355	1.2	2.5	1.9	2.2	2.0	2.5
77Se	0.394	1.3	6.4	5.1	7.2	6.4	7.9
88Sr	0.001	0.003	5.2	3.5	6.6	5.5	6.4
95Mo	0.001	0.003	0.476	0.352	0.559	0.456	0.704
107Ag	0.001	0.003	0.060	0.042	0.073	0.057	0.083
111Cd	0.162	0.540	24	16	23	17	25
118Sn	0.046	0.153	0.854	0.459	0.605	0.678	0.731
121Sb	0.004	0.013	0.041	0.027	0.041	0.034	0.027
137Ba	0.001	0.003	30	17	25	26	29
202Hg	0.020	0.067	0.130	0.123	0.146	0.149	0.192
205Tl	0.001	0.003	0.093	0.071	0.097	0.063	0.059
208Pb	0.002	0.007	0.213	0.108	0.216	0.154	0.151
238U	0.001	0.003	0.088	0.050	0.180	0.081	0.068

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck

Tissue Analysis Results

		Client ID	RG_LI8_INV-1_2022-07-14_N	RG_LI8_INV-2_2022-07-14_N	RG_LI8_INV-3_2022-07-14_N	RG_LI8_INV-4_2022-07-14_N	RG_LI8_INV-5_2022-07-14_N
		Lab ID	011	012	013	014	015
		Wet Weight (g)	2.4954	1.5764	1.3009	1.7800	2.2766
		Dry Weight (g)	0.4928	0.3076	0.2685	0.3745	0.4614
		Moisture (%)	80.3	80.5	79.4	79.0	79.7
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.016	0.053	0.572	0.437	0.636	0.617	0.501
11B	0.070	0.233	0.701	0.670	0.975	1.0	0.579
23Na	6.1	20	4,812	3,373	2,937	3,466	3,580
24Mg	0.126	0.420	1,867	2,211	2,333	1,878	2,111
27Al	0.049	0.163	213	187	550	477	201
31P	112	373	15,355	14,250	14,636	13,645	15,046
39K	2.5	8.3	16,215	12,443	10,865	13,001	12,480
44Ca	10	33	2,566	3,743	3,464	3,378	3,185
49Ti	0.001	0.003	11	12	37	27	12
51V	0.032	0.107	0.450	0.501	1.1	0.833	0.490
52Cr	0.204	0.680	2.5	3.4	5.9	4.1	3.5
55Mn	0.009	0.030	69	72	65	65	63
57Fe	1.7	5.7	254	242	427	325	239
59Co	0.013	0.043	4.1	7.5	6.3	5.5	4.2
60Ni	0.053	0.177	19	30	29	27	24
63Cu	0.018	0.060	16	28	22	23	20
66Zn	0.374	1.2	1,001	1,234	1,071	1,099	876
75As	0.355	1.2	2.2	2.5	2.8	2.6	2.2
77Se	0.394	1.3	6.0	7.0	6.4	5.9	6.6
88Sr	0.001	0.003	3.9	5.9	5.7	5.1	5.7
95Mo	0.001	0.003	0.445	0.663	0.497	0.580	0.414
107Ag	0.001	0.003	0.057	0.047	0.050	0.042	0.052
111Cd	0.162	0.540	32	40	48	38	27
118Sn	0.046	0.153	0.198	0.493	0.318	0.434	0.390
121Sb	0.004	0.013	0.043	0.033	0.038	0.036	0.035
137Ba	0.001	0.003	28	30	29	27	25
202Hg	0.020	0.067	0.164	0.167	0.155	0.142	0.146
205Tl	0.001	0.003	0.051	0.054	0.073	0.065	0.053
208Pb	0.002	0.007	0.116	0.136	0.198	0.199	0.124
238U	0.001	0.003	0.083	0.071	0.087	0.080	0.063

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck

Tissue Analysis Results

		Client ID	RG_LIDCOM_INV-1_2022-07-14_N	RG_LIDCOM_INV-2_2022-07-14_N	RG_LIDCOM_INV-3_2022-07-14_N	RG_LIDCOM_INV-4_2022-07-14_N	RG_LIDCOM_INV-5_2022-07-14_N
		Lab ID	016	017	018	019	020
		Wet Weight (g)	3.1320	2.1172	3.5987	2.2552	2.5120
		Dry Weight (g)	0.5584	0.4058	0.7108	0.4943	0.5414
		Moisture (%)	82.2	80.8	80.2	78.1	78.4
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.016	0.053	0.633	0.676	0.787	0.509	0.555
11B	0.070	0.233	0.746	1.1	1.3	0.769	0.615
23Na	6.1	20	4,450	5,082	4,038	3,855	3,640
24Mg	0.126	0.420	2,270	3,118	1,908	2,671	3,079
27Al	0.049	0.163	333	466	282	309	238
31P	112	373	15,375	18,169	13,480	13,909	15,743
39K	2.5	8.3	13,234	16,106	14,087	12,969	13,777
44Ca	10	33	2,603	3,316	2,030	2,856	2,402
49Ti	0.001	0.003	21	35	59	24	14
51V	0.032	0.107	0.658	0.970	1.5	0.701	0.509
52Cr	0.204	0.680	3.0	4.9	3.8	3.2	3.0
55Mn	0.009	0.030	76	77	71	77	111
57Fe	1.7	5.7	283	435	406	340	256
59Co	0.013	0.043	9.1	8.9	5.8	9.1	7.6
60Ni	0.053	0.177	25	29	20	28	24
63Cu	0.018	0.060	21	35	27	25	27
66Zn	0.374	1.2	863	1,312	667	1,198	944
75As	0.355	1.2	2.1	3.3	2.2	3.2	2.2
77Se	0.394	1.3	7.0	8.0	7.8	6.4	7.1
88Sr	0.001	0.003	4.3	5.9	3.6	4.5	4.8
95Mo	0.001	0.003	0.394	0.564	0.466	0.490	0.637
107Ag	0.001	0.003	0.042	0.050	0.035	0.040	0.035
111Cd	0.162	0.540	22	25	20	25	23
118Sn	0.046	0.153	0.402	0.426	0.191	0.334	0.337
121Sb	0.004	0.013	0.029	0.033	0.032	0.028	0.035
137Ba	0.001	0.003	22	27	31	24	41
202Hg	0.020	0.067	0.123	0.173	0.145	0.173	0.155
205Tl	0.001	0.003	0.105	0.149	0.103	0.154	0.094
208Pb	0.002	0.007	0.129	0.175	0.197	0.162	0.131
238U	0.001	0.003	0.103	0.148	0.109	0.126	0.119

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck

Tissue Analysis Results

		Client ID	RG_SLINE_INV-1_2022-07-12_N	RG_SLINE_INV-2_2022-07-12_N	RG_SLINE_INV-3_2022-07-12_N	RG_SLINE_INV-4_2022-07-12_N	RG_SLINE_INV-5_2022-07-12_N
		Lab ID	021	022	023	024	025
		Wet Weight (g)	1.4334	1.8567	1.5193	0.9022	2.6542
		Dry Weight (g)	0.2269	0.3582	0.3361	0.1793	0.5182
		Moisture (%)	84.2	80.7	77.9	80.1	80.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.016	0.053	0.540	0.365	0.528	0.661	0.338
11B	0.070	0.233	1.2	0.730	1.2	1.7	0.577
23Na	6.1	20	3,221	4,201	3,383	2,574	3,061
24Mg	0.126	0.420	1,965	2,076	2,152	2,123	1,756
27Al	0.049	0.163	704	366	564	981	392
31P	112	373	13,171	15,229	13,452	12,796	11,072
39K	2.5	8.3	11,137	13,363	13,075	8,432	9,673
44Ca	10	33	3,596	3,595	4,292	5,380	2,680
49Ti	0.001	0.003	48	23	38	68	24
51V	0.032	0.107	1.4	0.698	1.0	1.8	0.844
52Cr	0.204	0.680	6.5	3.6	4.3	18	3.2
55Mn	0.009	0.030	54	33	39	46	38
57Fe	1.7	5.7	495	260	346	857	311
59Co	0.013	0.043	1.8	1.5	1.2	1.7	1.5
60Ni	0.053	0.177	12	6.4	8.3	30	6.8
63Cu	0.018	0.060	24	19	20	19	17
66Zn	0.374	1.2	1,152	727	831	673	1,037
75As	0.355	1.2	2.4	1.9	1.5	1.3	1.7
77Se	0.394	1.3	5.8	5.6	6.0	5.3	5.8
88Sr	0.001	0.003	6.1	6.5	6.8	10	4.4
95Mo	0.001	0.003	0.588	0.539	0.637	0.539	0.343
107Ag	0.001	0.003	0.121	0.086	0.098	0.136	0.076
111Cd	0.162	0.540	7.3	4.8	6.7	3.2	6.3
118Sn	0.046	0.153	0.840	0.524	0.256	0.543	0.425
121Sb	0.004	0.013	0.026	0.014	0.028	0.032	0.013
137Ba	0.001	0.003	30	21	40	43	20
202Hg	0.020	0.067	0.112	0.097	0.102	0.107	0.097
205Tl	0.001	0.003	0.091	0.074	0.110	0.060	0.085
208Pb	0.002	0.007	0.231	0.121	0.220	0.310	0.129
238U	0.001	0.003	0.159	0.077	0.186	0.107	0.103

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck

Tissue Analysis Results

		Client ID	RG_LI24_INV-1_2022-07-11_N	RG_LI24_INV-2_2022-07-11_N	RG_LI24_INV-3_2022-07-11_N	RG_LI24_INV-4_2022-07-11_N	RG_LI24_INV-5_2022-07-11_N
		Lab ID	026	027	028	029	030
		Wet Weight (g)	1.6088	0.8935	1.3127	1.5384	1.3700
		Dry Weight (g)	0.2979	0.1388	0.2062	0.2575	0.2590
		Moisture (%)	81.5	84.5	84.3	83.3	81.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.016	0.053	0.798	0.502	0.578	1.5	0.661
11B	0.070	0.233	1.0	0.615	1.0	1.4	1.1
23Na	6.1	20	3,252	2,326	4,174	3,905	3,256
24Mg	0.126	0.420	2,080	1,952	2,217	2,614	2,158
27Al	0.049	0.163	761	347	441	874	594
31P	112	373	11,645	10,602	14,789	14,375	12,063
39K	2.5	8.3	10,334	7,313	12,883	12,507	10,332
44Ca	10	33	7,967	5,598	6,677	14,211	6,682
49Ti	0.001	0.003	60	20	30	68	41
51V	0.032	0.107	2.8	1.5	2.0	3.1	2.4
52Cr	0.204	0.680	7.8	5.9	10	6.4	8.3
55Mn	0.009	0.030	28	24	37	36	31
57Fe	1.7	5.7	494	317	471	517	434
59Co	0.013	0.043	1.7	1.1	1.7	1.8	1.2
60Ni	0.053	0.177	17	12	25	15	18
63Cu	0.018	0.060	17	19	19	19	19
66Zn	0.374	1.2	768	898	947	1,024	814
75As	0.355	1.2	1.8	1.2	1.7	1.8	1.2
77Se	0.394	1.3	7.1	5.8	7.8	7.0	7.3
88Sr	0.001	0.003	14	9.8	11	17	11
95Mo	0.001	0.003	0.490	0.343	0.539	0.539	0.466
107Ag	0.001	0.003	0.066	0.076	0.086	0.073	0.078
111Cd	0.162	0.540	2.2	2.5	3.0	2.9	2.2
118Sn	0.046	0.153	0.668	1.1	1.8	0.651	0.560
121Sb	0.004	0.013	0.053	0.031	0.051	0.065	0.049
137Ba	0.001	0.003	31	27	35	38	36
202Hg	0.020	0.067	0.104	0.107	0.092	0.112	0.102
205Tl	0.001	0.003	0.064	0.053	0.092	0.086	0.061
208Pb	0.002	0.007	0.301	0.164	0.218	0.306	0.247
238U	0.001	0.003	0.145	0.109	0.168	0.218	0.231

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck

Tissue Analysis Results

		Client ID	RG_LCUT_INV-1_2022-07-12_N	RG_LCUT_INV-2_2022-07-12_N	RG_LCUT_INV-3_2022-07-12_N	RG_LCUT_INV-4_2022-07-12_N	RG_LCUT_INV-5_2022-07-12_N
		Lab ID	031	032	033	034	035
		Wet Weight (g)	1.8059	1.7180	2.2917	1.1266	1.5490
		Dry Weight (g)	0.3411	0.3013	0.4754	0.1747	0.3010
		Moisture (%)	81.1	82.5	79.3	84.5	80.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.016	0.053	0.889	0.623	0.616	1.1	1.0
11B	0.070	0.233	2.0	1.7	1.7	3.8	3.4
23Na	6.1	20	3,230	3,009	3,133	3,313	3,288
24Mg	0.126	0.420	2,079	1,663	2,679	2,565	2,617
27Al	0.049	0.163	867	477	502	1,018	867
31P	112	373	15,427	12,211	17,168	15,226	17,254
39K	2.5	8.3	15,193	11,391	14,179	15,817	18,600
44Ca	10	33	3,145	3,368	4,928	7,645	6,891
49Ti	0.001	0.003	65	32	38	73	64
51V	0.032	0.107	1.9	1.0	1.2	2.5	1.7
52Cr	0.204	0.680	4.1	4.4	5.0	5.5	5.3
55Mn	0.009	0.030	61	33	54	65	68
57Fe	1.7	5.7	334	235	264	445	384
59Co	0.013	0.043	2.3	1.3	2.6	2.3	4.4
60Ni	0.053	0.177	19	13	17	20	26
63Cu	0.018	0.060	47	41	56	49	79
66Zn	0.374	1.2	343	280	469	448	544
75As	0.355	1.2	3.2	2.0	3.5	3.5	3.7
77Se	0.394	1.3	5.6	6.4	5.9	5.9	6.7
88Sr	0.001	0.003	6.4	5.5	9.7	13	12
95Mo	0.001	0.003	0.515	0.417	0.613	0.571	0.761
107Ag	0.001	0.003	0.040	0.050	0.055	0.063	0.082
111Cd	0.162	0.540	6.1	4.9	8.5	10	15
118Sn	0.046	0.153	0.254	0.498	0.459	0.582	0.546
121Sb	0.004	0.013	0.066	0.042	0.055	0.112	0.079
137Ba	0.001	0.003	80	33	46	63	60
202Hg	0.020	0.067	0.127	0.143	0.132	0.144	0.207
205Tl	0.001	0.003	0.060	0.042	0.046	0.078	0.082
208Pb	0.002	0.007	0.427	0.238	0.273	0.378	0.470
238U	0.001	0.003	0.156	0.108	0.120	0.154	0.225

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck

Tissue Analysis Results

		Client ID	RG_LILC3_INV-1_2022-07-12_N	RG_LILC3_INV-2_2022-07-12_N	RG_LILC3_INV-3_2022-07-12_N	RG_LILC3_INV-4_2022-07-12_N	RG_LILC3_INV-5_2022-07-12_N
		Lab ID	036	037	038	039	040
		Wet Weight (g)	1.9489	2.8853	2.3000	2.1081	2.1279
		Dry Weight (g)	0.3282	0.5289	0.3900	0.3726	0.4072
		Moisture (%)	83.2	81.7	83.0	82.3	80.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.016	0.053	0.789	0.512	1.0	0.685	0.616
11B	0.070	0.233	1.2	0.673	2.1	0.910	0.989
23Na	6.1	20	3,386	3,605	2,095	4,190	3,145
24Mg	0.126	0.420	2,055	1,663	1,422	1,961	1,834
27Al	0.049	0.163	186	167	295	187	141
31P	112	373	14,938	14,364	10,552	16,468	12,945
39K	2.5	8.3	14,890	12,705	9,601	16,114	13,740
44Ca	10	33	3,982	3,582	3,263	2,694	2,825
49Ti	0.001	0.003	8.6	8.6	24	9.8	7.6
51V	0.032	0.107	0.531	0.361	0.735	0.482	0.375
52Cr	0.204	0.680	4.1	2.3	3.2	2.4	2.4
55Mn	0.009	0.030	417	93	285	108	276
57Fe	1.7	5.7	276	195	393	262	224
59Co	0.013	0.043	7.9	2.9	5.3	3.7	8.3
60Ni	0.053	0.177	31	8.5	20	9.6	22
63Cu	0.018	0.060	33	29	26	29	33
66Zn	0.374	1.2	416	219	297	264	319
75As	0.355	1.2	2.1	1.7	1.3	2.2	1.8
77Se	0.394	1.3	10	8.2	6.6	7.9	7.5
88Sr	0.001	0.003	6.3	4.9	8.6	4.6	4.4
95Mo	0.001	0.003	0.992	0.435	0.544	0.408	0.788
107Ag	0.001	0.003	0.038	0.038	0.025	0.038	0.032
111Cd	0.162	0.540	9.9	4.2	9.2	4.0	9.8
118Sn	0.046	0.153	0.517	0.336	0.381	0.575	0.256
121Sb	0.004	0.013	0.052	0.036	0.062	0.033	0.040
137Ba	0.001	0.003	18	12	27	17	14
202Hg	0.020	0.067	0.204	0.173	0.127	0.173	0.170
205Tl	0.001	0.003	0.043	0.031	0.043	0.045	0.049
208Pb	0.002	0.007	0.162	0.120	0.273	0.157	0.140
238U	0.001	0.003	0.100	0.043	0.128	0.056	0.063

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck

Tissue Analysis Results

		Client ID	RG_FRUL_INV-1_2022-07-13_N	RG_FRUL_INV-2_2022-07-13_N	RG_FRUL_INV-3_2022-07-13_N	RG_FRUL_INV-4_2022-07-13_N	RG_FRUL_INV-5_2022-07-13_N
		Lab ID	041	042	043	044	045
		Wet Weight (g)	1.0058	1.4112	0.8580	1.1379	1.6455
		Dry Weight (g)	0.1696	0.2568	0.1482	0.2001	0.3407
		Moisture (%)	83.1	81.8	82.7	82.4	79.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.016	0.053	0.794	0.672	1.1	1.3	1.1
11B	0.070	0.233	1.2	0.653	2.1	1.2	1.3
23Na	6.1	20	2,296	2,948	2,743	2,399	2,938
24Mg	0.126	0.420	1,717	1,768	1,958	1,815	2,116
27Al	0.049	0.163	697	288	1,536	750	756
31P	112	373	11,461	10,705	12,113	10,116	10,844
39K	2.5	8.3	8,373	10,337	9,716	8,175	9,705
44Ca	10	33	4,380	3,309	6,047	4,487	4,461
49Ti	0.001	0.003	54	27	101	55	70
51V	0.032	0.107	1.3	0.542	2.6	1.5	1.7
52Cr	0.204	0.680	7.3	2.4	10	7.0	5.1
55Mn	0.009	0.030	69	67	81	79	87
57Fe	1.7	5.7	478	291	896	553	580
59Co	0.013	0.043	1.9	2.8	2.0	2.1	2.9
60Ni	0.053	0.177	12	7.2	16	12	12
63Cu	0.018	0.060	17	16	19	16	19
66Zn	0.374	1.2	395	370	351	371	473
75As	0.355	1.2	0.634	1.1	0.858	0.895	1.2
77Se	0.394	1.3	8.5	9.6	8.9	7.9	9.7
88Sr	0.001	0.003	5.7	3.4	9.6	5.7	5.3
95Mo	0.001	0.003	0.408	0.326	0.653	0.761	0.462
107Ag	0.001	0.003	0.161	0.132	0.195	0.113	0.132
111Cd	0.162	0.540	4.4	8.6	5.2	6.0	7.8
118Sn	0.046	0.153	0.715	0.738	0.861	0.696	0.464
121Sb	0.004	0.013	0.029	0.028	0.039	0.026	0.029
137Ba	0.001	0.003	33	17	57	30	37
202Hg	0.020	0.067	0.081	0.075	0.075	0.075	0.060
205Tl	0.001	0.003	0.026	0.025	0.037	0.033	0.040
208Pb	0.002	0.007	0.227	0.115	0.425	0.220	0.250
238U	0.001	0.003	0.082	0.069	0.100	0.075	0.097

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck

Tissue Analysis Results

		Client ID	RG_FO23_INV-1_2022-07-11_N	RG_FO23_INV-2_2022-07-11_N	RG_FO23_INV-3_2022-07-11_N	RG_FO23_INV-4_2022-07-11_N	RG_FO23_INV-5_2022-07-11_N
		Lab ID	046	047	048	049	050
		Wet Weight (g)	1.4184	1.6011	0.6792	1.2185	1.2480
		Dry Weight (g)	0.2623	0.2635	0.1231	0.2347	0.2584
		Moisture (%)	81.5	83.5	81.9	80.7	79.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.016	0.053	0.828	0.945	1.3	0.807	0.538
11B	0.070	0.233	1.4	1.8	1.3	1.6	0.871
23Na	6.1	20	2,579	2,878	2,868	2,743	1,935
24Mg	0.126	0.420	1,662	1,838	1,536	1,420	1,543
27Al	0.049	0.163	761	976	695	939	619
31P	112	373	9,264	12,606	10,294	10,834	9,283
39K	2.5	8.3	8,763	10,809	9,039	8,963	7,831
44Ca	10	33	3,101	3,358	2,605	2,881	2,671
49Ti	0.001	0.003	51	50	50	65	45
51V	0.032	0.107	1.2	1.7	1.1	1.5	1.1
52Cr	0.204	0.680	4.9	5.5	6.5	3.7	5.2
55Mn	0.009	0.030	60	62	51	69	47
57Fe	1.7	5.7	428	565	426	435	358
59Co	0.013	0.043	1.7	2.1	1.5	1.9	1.1
60Ni	0.053	0.177	9.4	12	12	9.0	9.4
63Cu	0.018	0.060	16	18	17	16	15
66Zn	0.374	1.2	428	558	563	448	426
75As	0.355	1.2	0.671	0.821	0.560	0.671	0.448
77Se	0.394	1.3	7.1	10	8.9	6.9	6.4
88Sr	0.001	0.003	4.9	5.1	3.7	4.4	3.6
95Mo	0.001	0.003	0.381	0.544	0.353	0.381	0.190
107Ag	0.001	0.003	0.069	0.082	0.095	0.069	0.120
111Cd	0.162	0.540	4.8	4.5	3.3	4.6	2.5
118Sn	0.046	0.153	0.401	0.604	0.480	0.381	0.182
121Sb	0.004	0.013	0.020	0.033	0.022	0.025	0.020
137Ba	0.001	0.003	23	31	20	27	23
202Hg	0.020	0.067	0.052	0.081	0.081	0.086	0.063
205Tl	0.001	0.003	0.038	0.036	0.029	0.030	0.023
208Pb	0.002	0.007	0.199	0.282	0.173	0.241	0.164
238U	0.001	0.003	0.047	0.064	0.050	0.058	0.039

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

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Tissue QA/QC Relative Percent Difference Results

Client ID		RG_LISP24_INV-2_2022-07-13_N			RG_LI8_INV-1_2022-07-14_N			RG_LIDCOM_INV-1_2022-07-14_N		
Lab ID		002			011			016		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.016	0.726	0.793	8.8	0.572	0.530	7.6	0.633	0.572	10
11B	0.070	0.914	1.0	9.0	0.701	0.670	-	0.746	0.579	-
23Na	6.1	4,997	5,308	6.0	4,812	3,895	21	4,450	3,874	14
24Mg	0.126	2,133	2,152	0.9	1,867	2,042	9.0	2,270	2,185	3.8
27Al	0.049	392	496	23	213	215	0.9	333	271	21
31P	112	17,235	17,543	1.8	15,355	13,926	9.8	15,375	15,332	0.3
39K	2.5	15,601	15,501	0.6	16,215	12,772	24	13,234	11,905	11
44Ca	10	3,702	3,660	1.1	2,566	2,451	4.6	2,603	2,059	23
49Ti	0.001	27	28	3.6	11	11	0.0	21	19	10
51V	0.032	0.830	0.881	6.0	0.450	0.439	2.5	0.658	0.506	26
52Cr	0.204	6.0	8.2	31	2.5	2.9	15	3.0	2.7	11
55Mn	0.009	91	86	5.6	69	59	16	76	71	6.8
57Fe	1.7	411	461	12	254	234	8.2	283	221	25
59Co	0.013	8.4	7.5	11	4.1	3.8	7.6	9.1	7.7	17
60Ni	0.053	26	29	11	19	22	15	25	19	27
63Cu	0.018	41	36	13	16	20	22	21	22	4.7
66Zn	0.374	755	675	11	1,001	843	17	863	795	8.2
75As	0.355	2.5	2.4	-	2.2	1.9	-	2.1	2.1	-
77Se	0.394	7.2	7.1	1.4	6.0	6.1	1.7	7.0	6.5	7.4
88Sr	0.001	5.7	5.7	0.0	3.9	4.1	5.0	4.3	3.1	32
95Mo	0.001	0.725	0.684	5.8	0.445	0.476	6.7	0.394	0.414	5.0
107Ag	0.001	0.094	0.089	5.5	0.057	0.042	30	0.042	0.036	15
111Cd	0.162	19	17	11	32	31	3.2	22	19	15
118Sn	0.046	0.677	0.708	-	0.198	0.254	-	0.402	0.307	-
121Sb	0.004	0.040	0.039	-	0.043	0.033	-	0.029	0.037	-
137Ba	0.001	23	23	0.0	28	25	11	22	16	32
202Hg	0.020	0.119	0.119	-	0.164	0.174	-	0.123	0.123	-
205Tl	0.001	0.084	0.090	6.9	0.051	0.059	15	0.105	0.093	12
208Pb	0.002	0.170	0.183	7.4	0.116	0.117	0.9	0.129	0.104	22
238U	0.001	0.072	0.072	0.0	0.083	0.066	23	0.103	0.082	23

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_LIDCOM_INV-5_2022-07-14_N			RG_LI24_INV-2_2022-07-11_N		
Lab ID		020			027		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.016	0.555	0.441	23	0.502	0.418	18
11B	0.070	0.615	0.615	-	0.615	0.538	-
23Na	6.1	3,640	2,994	20	2,326	2,082	11
24Mg	0.126	3,079	2,091	38	1,952	1,753	11
27Al	0.049	238	204	15	347	263	28
31P	112	15,743	13,551	15	10,602	9,350	13
39K	2.5	13,777	12,281	12	7,313	5,591	27
44Ca	10	2,402	2,041	16	5,598	4,684	18
49Ti	0.001	14	12	15	20	17	16
51V	0.032	0.509	0.391	26	1.5	1.2	22
52Cr	0.204	3.0	2.7	11	5.9	6.9	16
55Mn	0.009	111	88	23	24	20	18
57Fe	1.7	256	201	24	317	282	12
59Co	0.013	7.6	5.5	32	1.1	0.863	24
60Ni	0.053	24	20	18	12	12	0.0
63Cu	0.018	27	19	35	19	21	10
66Zn	0.374	944	707	29	898	619	37
75As	0.355	2.2	1.7	-	1.2	1.2	-
77Se	0.394	7.1	7.0	1.4	5.8	5.9	1.7
88Sr	0.001	4.8	3.4	34	9.8	8.5	14
95Mo	0.001	0.637	0.441	36	0.343	0.343	0.0
107Ag	0.001	0.035	0.025	33	0.076	0.068	11
111Cd	0.162	23	24	4.3	2.5	1.6	-
118Sn	0.046	0.337	0.438	-	1.1	0.719	-
121Sb	0.004	0.035	0.023	-	0.031	0.029	-
137Ba	0.001	41	32	25	27	24	12
202Hg	0.020	0.155	0.115	-	0.107	0.107	-
205Tl	0.001	0.094	0.069	31	0.053	0.045	16
208Pb	0.002	0.131	0.087	40	0.164	0.132	22
238U	0.001	0.119	0.089	29	0.109	0.087	22

Notes:

ppm = parts per million
RPD = relative percent difference
DL = detection limit
< = less than detection limit
% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%
Minimum DQOs apply to individual samples at concentrations above 10x DL

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Tissue QA/QC Accuracy and Precision Results

		Sample Group ID	01			02		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.016	1.21	1.3	107	11	1.4	112	9.9
11B	0.070	4.5	4.9	108	4.2	4.9	108	6.7
23Na	6.1	14,000	16,167	115	9.3	13,667	98	3.2
24Mg	0.126	910	1,035	114	6.8	933	102	4.5
27Al	0.049	197.2	187	95	4.8	195	99	7.0
31P	112	8,000	8,808	110	4.4	7,796	98	5.1
39K	2.5	15,500	18,153	117	4.3	15,337	99	3.5
44Ca	10	2,360	2,727	116	1.9	2,552	108	2.7
49Ti	0.001	12.24	12	98	6.8	14	114	10
51V	0.032	1.57	1.8	116	9.4	1.7	107	7.8
52Cr	0.204	1.87	2.3	122	5.5	2.0	106	2.3
55Mn	0.009	3.17	3.7	118	4.1	3.4	108	3.8
57Fe	1.7	343	386	113	3.7	371	108	4.2
59Co	0.013	0.25	0.321	128	6.7	0.279	112	10
60Ni	0.053	1.34	1.6	119	7.2	1.4	108	3.8
63Cu	0.018	15.7	19	119	5.1	17	110	2.6
66Zn	0.374	51.6	59	115	0.8	54	104	4.3
75As	0.355	6.87	7.8	114	5.4	6.8	99	2.6
77Se	0.394	3.45	3.8	109	13	3.6	104	9.2
88Sr	0.001	10.1	12	119	0.0	11	109	0.0
95Mo	0.001	0.29	0.311	107	14	0.284	98	3.5
107Ag	0.001	0.0252	0.029	113	10	0.024	95	9.3
111Cd	0.162	0.299	0.288	96	6.1	0.333	111	12
118Sn	0.046	0.061	0.085	139	15	0.074	121	20
121Sb	0.004	0.011	0.014	130	18	0.012	109	17
137Ba	0.001	8.6	8.8	102	2.2	8.7	101	5.9
202Hg	0.020	0.412	0.427	104	5.9	0.467	113	9.1
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.002	0.404	0.496	123	9.5	0.464	115	9.5
238U	0.001	0.05	0.058	115	3.3	0.057	113	11

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

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Tissue QA/QC Accuracy and Precision Results

Sample Group ID			03		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.016	1.21	1.4	112	6.6
11B	0.070	4.5	4.4	98	3.4
23Na	6.1	14,000	14,288	102	6.1
24Mg	0.126	910	909	100	5.7
27Al	0.049	197.2	176	89	9.3
31P	112	8,000	7,836	98	7.0
39K	2.5	15,500	16,287	105	4.6
44Ca	10	2,360	2,480	105	3.3
49Ti	0.001	12.24	10	86	10
51V	0.032	1.57	1.6	102	12
52Cr	0.204	1.87	1.9	102	5.3
55Mn	0.009	3.17	3.5	111	12
57Fe	1.7	343	371	108	6.6
59Co	0.013	0.25	0.286	114	5.4
60Ni	0.053	1.34	1.5	109	6.1
63Cu	0.018	15.7	17	108	7.2
66Zn	0.374	51.6	52	101	3.4
75As	0.355	6.87	6.7	98	3.3
77Se	0.394	3.45	3.7	108	7.7
88Sr	0.001	10.1	11	111	7.5
95Mo	0.001	0.29	0.294	101	10
107Ag	0.001	0.0252	0.022	87	16
111Cd	0.162	0.299	0.301	101	13
118Sn	0.046	0.061	0.053	87	5.0
121Sb	0.004	0.011	0.010	89	9.8
137Ba	0.001	8.6	7.7	90	5.7
202Hg	0.020	0.412	0.425	103	5.8
205Tl	0.001	0.0013	-	-	-
208Pb	0.002	0.404	0.400	99	6.6
238U	0.001	0.05	0.052	105	5.5

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_LISP24_INV-1_2022-07-13_N	001	05 Aug 2022
	RG_LISP24_INV-2_2022-07-13_N	002	
	RG_LISP24_INV-3_2022-07-13_N	003	
	RG_LISP24_INV-4_2022-07-13_N	004	
	RG_LISP24_INV-5_2022-07-13_N	005	
	RG_LIDSL_INV-1_2022-07-11_N	006	
	RG_LIDSL_INV-2_2022-07-11_N	007	
	RG_LIDSL_INV-3_2022-07-11_N	008	
	RG_LIDSL_INV-4_2022-07-11_N	009	
	RG_LIDSL_INV-5_2022-07-11_N	010	
	RG_LI8_INV-1_2022-07-14_N	011	
	RG_LI8_INV-2_2022-07-14_N	012	
	RG_LI8_INV-3_2022-07-14_N	013	
	RG_LI8_INV-4_2022-07-14_N	014	
	RG_LI8_INV-5_2022-07-14_N	015	
	RG_LIDCOM_INV-1_2022-07-14_N	016	
02	RG_LIDCOM_INV-2_2022-07-14_N	017	05 Aug 2022
	RG_LIDCOM_INV-3_2022-07-14_N	018	
	RG_LIDCOM_INV-4_2022-07-14_N	019	
	RG_LIDCOM_INV-5_2022-07-14_N	020	
	RG_SLINE_INV-1_2022-07-12_N	021	
	RG_SLINE_INV-2_2022-07-12_N	022	
	RG_SLINE_INV-3_2022-07-12_N	023	
	RG_SLINE_INV-4_2022-07-12_N	024	
	RG_SLINE_INV-5_2022-07-12_N	025	
	RG_LI24_INV-1_2022-07-11_N	026	
	RG_LI24_INV-2_2022-07-11_N	027	
	RG_LI24_INV-3_2022-07-11_N	028	
	RG_LI24_INV-4_2022-07-11_N	029	
	RG_LI24_INV-5_2022-07-11_N	030	
	RG_LCUT_INV-1_2022-07-12_N	031	
	RG_LCUT_INV-2_2022-07-12_N	032	
	RG_LCUT_INV-3_2022-07-12_N	033	
03	RG_LCUT_INV-4_2022-07-12_N	034	05 Aug 2022
	RG_LCUT_INV-5_2022-07-12_N	035	
	RG_LILC3_INV-1_2022-07-12_N	036	
	RG_LILC3_INV-2_2022-07-12_N	037	
	RG_LILC3_INV-3_2022-07-12_N	038	
	RG_LILC3_INV-4_2022-07-12_N	039	
	RG_LILC3_INV-5_2022-07-12_N	040	

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Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
03	RG_FRUL_INV-1_2022-07-13_N	041	05 Aug 2022
	RG_FRUL_INV-2_2022-07-13_N	042	
	RG_FRUL_INV-3_2022-07-13_N	043	
	RG_FRUL_INV-4_2022-07-13_N	044	
	RG_FRUL_INV-5_2022-07-13_N	045	
	RG_FO23_INV-1_2022-07-11_N	046	
	RG_FO23_INV-2_2022-07-11_N	047	
	RG_FO23_INV-3_2022-07-11_N	048	
	RG_FO23_INV-4_2022-07-11_N	049	
	RG_FO23_INV-5_2022-07-11_N	050	

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COC ID:	LCO LAEMP	TURNAROUND TIME:		RUSH:

Facility Name / Job#	Regional Effects Program			Lab Name	TrichAnalytics Inc.			Report Format / Distribution	Excel / PDF / EDD
Project Manager	Cybele Heddle			Lab Contact	Jennie Christensen			Email 1:	Cybele.Heddle@teck.com X Y X
Email	Cybele.Heddle@teck.com			Email	jennie.christensen@trichanalytics			Email 2:	Tyler.Mehler@minnow.ca X X X
Address	421 Pine Ave			Address	207-1753 Sean Heights			Email 3:	Jessica.Ritz@teck.com X X X
								Email 4:	Hannah.Fenner@teck.com X X X
City	Sparwood	Province	BC	City	Saanichton	Province	BC	Email 5:	Kbatchelar@minnow.ca X X X
Postal Code	V0B 2G0			Postal Code					
Phone Number	250-910-8755			Phone Number				PO number	818999

Sample ID	Trich ID:	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
RG_LISP24_INV-1_2022-07-13_N	001	RG_LISP24	TA	NO	13-Jul-22	13:19	INV	Composite	Composite	1	X	X	X
RG_LISP24_INV-2_2022-07-13_N	002	RG_LISP24	TA	NO	13-Jul-22	13:19	INV	Composite	Composite	1	X	X	X
RG_LISP24_INV-3_2022-07-13_N	003	RG_LISP24	TA	NO	13-Jul-22	13:21	INV	Composite	Composite	1	X	X	X
RG_LISP24_INV-4_2022-07-13_N	004	RG_LISP24	TA	NO	13-Jul-22	13:56	INV	Composite	Composite	1	X	X	X
RG_LISP24_INV-5_2022-07-13_N	005	RG_LISP24	TA	NO	13-Jul-22	14:00	INV	Composite	Composite	1	X	X	X
RG_LIDSL_INV-1_2022-07-11_N	006	RG_LIDSL	TA	NO	11-Jul-22	13:40	INV	Composite	Composite	1	X	X	X
RG_LIDSL_INV-2_2022-07-11_N	007	RG_LIDSL	TA	NO	11-Jul-22	13:45	INV	Composite	Composite	1	X	X	X
RG_LIDSL_INV-3_2022-07-11_N	008	RG_LIDSL	TA	NO	11-Jul-22	14:03	INV	Composite	Composite	1	X	X	X
RG_LIDSL_INV-4_2022-07-11_N	009	RG_LIDSL	TA	NO	11-Jul-22	14:14	INV	Composite	Composite	1	X	X	X

Additional Comments / Special Instructions	Relinquished by / Affiliation	Date/Time	Accepted by / Affiliation	Date/Time
PO 818999	Rick Smit/Lotic Environmental	August 2, 2022	Gerene LaBine (signature)	03Aug2022 / 0930 (Project #: 2022-364)

Service Request				
Regular (default)	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge				
Emergency (1 Business Day) - 100% surcharge	Sampler's Signature	(signature)	Date/Time	August 2, 2022
For Emergency <1 Day, ASAP or Weekend				

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COC ID:	LCO LAEMP	TURNAROUND TIME:		RUSH:

Facility Name / Job#	Regional Effects Program			Lab Name	TrichAnalytics Inc.			Report Format / Distribution	Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Jennie Christensen			Email 1: [illegible]	X	X	X
Email	Cybele.Heddle@teck.com			Email	jennie.christensen@trichanalytics			Email 2: [illegible]	X	X	X
Address	421 Pine Ave			Address	207-1753 Sean Heights			Email 3: [illegible]	X	X	X
								Email 4: [illegible]	X	X	X
City	Sparwood	Province	BC	City	Saanichton	Province	BC	Email 5: [illegible]	X	X	X
Postal Code	V0B 2G0			Postal Code							
Phone Number	250-910-8755			Phone Number				PO number	818999		

Sample ID	Trich ID:	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
RG_LIDSL_INV-5_2022-07-11_N	010	RG_LIDSL	TA	NO	11-Jul-22	14:30	INV	Composite	Composite	1	X	X	X
RG_LI8_INV-1_2022-07-14_N	011	RG_LI8	TA	NO	14-Jul-22	10:08	INV	Composite	Composite	1	X	X	X
RG_LI8_INV-2_2022-07-14_N	012	RG_LI8	TA	NO	14-Jul-22	10:30	INV	Composite	Composite	1	X	X	X
RG_LI8_INV-3_2022-07-14_N	013	RG_LI8	TA	NO	14-Jul-22	10:43	INV	Composite	Composite	1	X	X	X
RG_LI8_INV-4_2022-07-14_N	014	RG_LI8	TA	NO	14-Jul-22	11:14	INV	Composite	Composite	1	X	X	X
RG_LI8_INV-5_2022-07-14_N	015	RG_LI8	TA	NO	14-Jul-22	11:21	INV	Composite	Composite	1	X	X	X
RG_LIDCOM_INV-1_2022-07-14_N	016	RG_LIDCOM	TA	NO	14-Jul-22	13:02	INV	Composite	Composite	1	X	X	X
RG_LIDCOM_INV-2_2022-07-14_N	017	RG_LIDCOM	TA	NO	14-Jul-22	13:23	INV	Composite	Composite	1	X	X	X
RG_LIDCOM_INV-3_2022-07-14_N	018	RG_LIDCOM	TA	NO	14-Jul-22	13:28	INV	Composite	Composite	1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION		RECEIVED BY/AFFILIATION	DATE/TIME
PO 818999	Rick Smit/Lotic Environmental		Genene LaBine	03 Aug 2022 / 0930
			[signature]	(Project # 2022-364)

SERVICE REQUEST				
Regular (default)	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge				
Emergency (1 Business Day) - 100% surcharge	Sampler's Signature		Date/Time	
For Emergency <1 Day, ASAP or Weekend				

Teck

COC ID: LCO LAEMP | **TURNAROUND TIME:** | **RUSH:**

Facility Name / Job#	Regional Effects Program			Lab Name	TrichAnalytics Inc.			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Jennie Christensen			Email 1:	Cybele.Heddle@teck.com	X	X	X
Email	Cybele.Heddle@teck.com			Email	jennie.christensen@trichanalytics			Email 2:	Tyler.Mather@minnow.ca	X	X	X
Address	421 Pine Ave			Address	207-1753 Sean Heights			Email 3:	Jessica.Ritz@teck.com	X	X	X
								Email 4:	Hannah.Penner@teck.com	X	X	X
City	Sparwood	Province	BC	City	Saanichton	Province	BC	Email 5:	Kbatchelar@minnow.ca	X	X	X
Postal Code	V0B 2G0			Postal Code								
Phone Number	250-910-8755			Phone Number				PO number	818999			

Sample ID	TrichID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
RG_LIDCOM_INV-4_2022-07-14_N	019	RG_LIDCOM	TA	NO	14-Jul-22	13:46	INV	Composite	Composite	1	X	X	X
RG_LIDCOM_INV-5_2022-07-14_N	020	RG_LIDCOM	TA	NO	14-Jul-22	14:07	INV	Composite	Composite	1	X	X	X
RG_SLINE_INV-1_2022-07-12_N	021	RG_SLINE	TA	NO	12-Jul-22	14:11	INV	Composite	Composite	1	X	X	X
RG_SLINE_INV-2_2022-07-12_N	022	RG_SLINE	TA	NO	12-Jul-22	14:20	INV	Composite	Composite	1	X	X	X
RG_SLINE_INV-3_2022-07-12_N	023	RG_SLINE	TA	NO	12-Jul-22	14:44	INV	Composite	Composite	1	X	X	X
RG_SLINE_INV-4_2022-07-12_N	024	RG_SLINE	TA	NO	12-Jul-22	14:54	INV	Composite	Composite	1	X	X	X
RG_SLINE_INV-5_2022-07-12_N	025	RG_SLINE	TA	NO	12-Jul-22	15:04	INV	Composite	Composite	1	X	X	X
RG_LI24_INV-1_2022-07-11_N	026	RG_LI24	TA	NO	11-Jul-22	10:49	INV	Composite	Composite	1	X	X	X
RG_LI24_INV-2_2022-07-11_N	027	RG_LI24	TA	NO	11-Jul-22	11:20	INV	Composite	Composite	1	X	X	X

PO 818999

Rick Smit/Lotic Environmental

Geneviève LaBine 03Aug2022 / 0930
(Project # 2022-364)

Regular (default)	**Sampler's Name**	**Rick Smit**		**Mobile #**	**403-586-3241**
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge	**Sampler's Signature**			**Date/Time**	
For Emergency <1 Day, ASAP or Weekend					

Teck

COC ID:	LCO LAEMP	TURNAROUND TIME:		RUSH:

Facility Name / Job#	Regional Effects Program			Lab Name	TrichAnalytics Inc.			Report Format / Distribution	Excel / PDF / EDD
Project Manager	Cybele Heddle			Lab Contact	Jennie Christensen			Email 1: Cybele.Heddle@teck.com	X / X / X
Email	Cybele.Heddle@teck.com			Email	jennie.christensen@trichanalytics			Email 2: Tyler.Mehler@minnow.ca	X / X / X
Address	421 Pine Ave			Address	207-1753 Sean Heights			Email 3: Jessica.Ritz@teck.com	X / X / X
								Email 4: [illegible]@teck.com	X / X / X
City	Sparwood	Province	BC	City	Saanichton	Province	BC	Email 5: Kbatchelar@minnow.ca	X / X / X
Postal Code	V0B 2G0			Postal Code					
Phone Number	250-910-8755			Phone Number				PO number	818999

Sample ID	Trich ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
RG_LI24_INV-3_2022-07-11_N	028	RG_LI24	TA	NO	11-Jul-22	11:21	INV	Composite	Composite	1	X	X	X
RG_LI24_INV-4_2022-07-11_N	029	RG_LI24	TA	NO	11-Jul-22	12:06	INV	Composite	Composite	1	X	X	X
RG_LI24_INV-5_2022-07-11_N	030	RG_LI24	TA	NO	11-Jul-22	12:16	INV	Composite	Composite	1	X	X	X
RG_LCUT_INV-1_2022-07-12_N	031	RG_LCUT	TA	NO	12-Jul-22	9:49	INV	Composite	Composite	1	X	X	X
RG_LCUT_INV-2_2022-07-12_N	032	RG_LCUT	TA	NO	12-Jul-22	9:58	INV	Composite	Composite	1	X	X	X
RG_LCUT_INV-3_2022-07-12_N	033	RG_LCUT	TA	NO	12-Jul-22	10:32	INV	Composite	Composite	1	X	X	X
RG_LCUT_INV-4_2022-07-12_N	034	RG_LCUT	TA	NO	12-Jul-22	10:47	INV	Composite	Composite	1	X	X	X
RG_LCUT_INV-5_2022-07-12_N	035	RG_LCUT	TA	NO	12-Jul-22	10:51	INV	Composite	Composite	1	X	X	X
RG_LILC3_INV-1_2022-07-12_N	036	RG_LILC3	TA	NO	12-Jul-22	11:51	INV	Composite	Composite	1	X	X	X

PO 818999	Rick Smit/Lotic Environmental	Genene LaBine	03 Aug2022 / 0930
		[signature]	(Project #: 2022-364)

Regular (default) Priority (2-3 business days) - 50% surcharge	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Emergency (1 Business Day) - 100% surcharge For Emergency <1 Day, ASAP or Weekend	Sampler's Signature		Date/Time	

Teck

COC ID:	LCO LAEMP	TURNAROUND TIME:		RUSH:	

Facility Name / Job#	Regional Effects Program			Lab Name	TrichAnalytics Inc.		
Project Manager	Cybele Heddle			Lab Contact	Jennie Christensen		
Email	Cybele.Heddle@teck.com			Email	jennie.christensen@trichanalytics		
Address	421 Pine Ave			Address	207-1753 Sean Heights		
City	Sparwood	Province	BC	City	Saanichton	Province	BC
Postal Code	V0B 2G0			Postal Code			
Phone Number	250-910-8755			Phone Number			

Report Format / Distribution		Excel	PDF	EDD
Email 1:	Cybele.Heddle@teck.com	X	X	X
Email 2:	Tyler.Mertel@minnow.ca	X	X	X
Email 3:	Jessica.Ritz@teck.com	X	X	X
Email 4:	Hannah.Haines@teck.com	X	X	X
Email 5:	Kbalchelas@minnow.ca	X	X	X
PO number	818999			

Sample ID	Trich ID:	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	Number of containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
RG_LILC3_INV-2_2022-07-12_N	037	RG_LILC3	TA	NO	12-Jul-22	11:51	INV	Composite	Composite	1	X	X	X
RG_LILC3_INV-3_2022-07-12_N	038	RG_LILC3	TA	NO	12-Jul-22	12:35	INV	Composite	Composite	1	X	X	X
RG_LILC3_INV-4_2022-07-12_N	039	RG_LILC3	TA	NO	12-Jul-22	12:38	INV	Composite	Composite	1	X	X	X
RG_LILC3_INV-5_2022-07-12_N	040	RG_LILC3	TA	NO	12-Jul-22	12:39	INV	Composite	Composite	1	X	X	X
RG_FRUL_INV-1_2022-07-13_N	041	RG_FRUL	TA	NO	13-Jul-22	10:38	INV	Composite	Composite	1	X	X	X
RG_FRUL_INV-2_2022-07-13_N	042	RG_FRUL	TA	NO	13-Jul-22	10:39	INV	Composite	Composite	1	X	X	X
RG_FRUL_INV-3_2022-07-13_N	043	RG_FRUL	TA	NO	13-Jul-22	10:47	INV	Composite	Composite	1	X	X	X
RG_FRUL_INV-4_2022-07-13_N	044	RG_FRUL	TA	NO	13-Jul-22	11:22	INV	Composite	Composite	1	X	X	X
RG_FRUL_INV-5_2022-07-13_N	045	RG_FRUL	TA	NO	13-Jul-22	11:28	INV	Composite	Composite	1	X	X	X

PO 818999

Rick Smit/Lotic Environmental

Genevieve LaBine 03Aug2022/0930
(Project #: 2022-364)

Regular (default)	**Sampler's Name**	**Rick Smit**	**Mobile #** **403-586-3241**
Priority (2-3 business days) - 50% surcharge			
Emergency (1 Business Day) - 100% surcharge	**Sampler's Signature**		**Date/Time**
For Emergency <1 Day, ASAP or Weekend			

Teck

COC ID:	LCO LAEMP	TURNAROUND TIME:		RUSH:

Facility Name / Job#	Regional Effects Program	Lab Name	TrichAnalytics Inc.
Project Manager	Cybele Heddle	Lab Contact	Jennie Christensen
Email	Cybele.Heddle@teck.com	Email	jennie.christensen@trichanalytics
Address	421 Pine Ave	Address	207-1753 Sean Heights
City	Sparwood Province BC	City	Saanichton Province BC
Postal Code	V0B 2G0	Postal Code	
Phone Number	250-910-8755	Phone Number	

Report Format / Distribution		Excel	PDF	EDD
Email 1:	Cybele.Heddle@teck.com	X	X	X
Email 2:	Tyler.Mehler@minnow.ca	X	X	X
Email 3:	[illegible]@teck.com	X	X	X
Email 4:	[illegible]@teck.com	X	X	X
Email 5:	Kbatchelar@minnow.ca	X	X	X
PO number	818999			

Sample ID	Trichin.	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
RG_FO23_INV-1_2022-07-11_N	046	RG_FO23	TA	NO	11-Jul-22	16:01	INV	Composite	Composite	1	X	X	X
RG_FO23_INV-2_2022-07-11_N	047	RG_FO23	TA	NO	11-Jul-22	16:01	INV	Composite	Composite	1	X	X	X
RG_FO23_INV-3_2022-07-11_N	048	RG_FO23	TA	NO	11-Jul-22	16:21	INV	Composite	Composite	1	X	X	X
RG_FO23_INV-4_2022-07-11_N	049	RG_FO23	TA	NO	11-Jul-22	16:36	INV	Composite	Composite	1	X	X	X
RG_FO23_INV-5_2022-07-11_N	050	RG_FO23	TA	NO	11-Jul-22	16:37	INV	Composite	Composite	1	X	X	X
			TA	NO			INV	Composite	Composite	1	X	X	X
			TA	NO			INV	Composite	Composite	1	X	X	X
			TA	NO			INV	Composite	Composite	1	X	X	X
			TA	NO			INV	Composite	Composite	1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
PO 818999	Rick Smit/Lotic Environmental		Genene LaBine / Genene LB	03 Aug 2022 / 0930 (Project # 2022-364)

SERVICE REQUEST				
Regular (default)	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge				
Emergency (1 Business Day) - 100% surcharge	Sampler's Signature		Date/Time	
For Emergency <1 Day, ASAP or Weekend				

BENTHIC TISSUE CHEMISTRY

TrichAnalytics Laboratory Report 2022-401

(Finalized October 19, 2022)

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Cybele Heddle
Project Manager
Teck Coal Ltd
Phone: (250) 865-3048
Email: aquascilab@teck.com; tyler.mehler@minnow.ca; teck.lab.results@teck.com; lisa.bowron@minnow.ca; hannah.penner@teck.com; teckcoal@equisonline.com; cybele.heddle@teck.com

Date Received:	20 Sep 2022
Date of Analysis:	30 Sep 2022
Final Report Date:	19 Oct 2022
Project No.:	2022-401
Method No.:	MET-002.06

Client Project: REP_LAEMP_LCO_2022-09 Regional Effects Program (PO 818999)

Analytical Request: Composite Benthic Invertebrate Tissue Microchemistry (total metals & moisture) - 51 samples. See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in parts per million (ppm) dry weight (equivalent to mg/kg).
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.
Client specific DQO for Selenium accuracy is 90-110% of the certified value; result achieved 101% (ranging from 92-107%).

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio — 19 Oct 2022 (Date)

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FO23_INV-1_2022-09-09_N	RG_FO23_INV-2_2022-09-09_N	RG_FO23_INV-3_2022-09-09_N	RG_FO23_INV-4_2022-09-09_N	RG_FO23_INV-5_2022-09-10_N
		Lab ID	352	353	354	355	356
		Wet Weight (g)	0.9614	0.7641	1.4697	0.6390	0.9292
		Dry Weight (g)	0.2330	0.2025	0.3747	0.1492	0.1937
		Moisture (%)	75.8	73.5	74.5	76.7	79.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.017	0.057	0.490	0.201	0.340	0.406	0.478
11B	0.090	0.300	0.802	0.367	0.451	0.651	0.902
23Na	11	37	2,551	1,830	3,443	3,338	3,934
24Mg	0.082	0.273	1,299	912	1,534	2,236	1,737
27Al	0.070	0.233	132	65	60	107	159
31P	82	273	10,605	8,385	10,516	12,287	13,643
39K	2.9	9.7	7,179	5,473	10,206	9,702	11,945
44Ca	22	73	1,932	1,202	1,787	3,150	2,619
49Ti	0.001	0.003	11	3.4	3.0	6.5	12
51V	0.032	0.107	0.230	0.120	0.120	0.190	0.255
52Cr	0.055	0.183	2.9	2.0	1.7	3.7	2.4
55Mn	0.008	0.027	22	16	21	53	64
57Fe	0.766	2.6	129	75	70	196	174
59Co	0.012	0.040	0.955	0.840	0.856	2.1	3.0
60Ni	0.015	0.050	6.3	7.2	6.1	16	19
63Cu	0.020	0.067	13	9.6	12	20	13
66Zn	0.253	0.843	318	232	250	434	351
75As	0.385	1.3	0.480	0.541	0.492	1.0	1.5
77Se	0.368	1.2	8.1	5.7	6.8	11	11
88Sr	0.001	0.003	2.7	1.8	2.3	4.6	4.0
95Mo	0.001	0.003	0.193	0.135	0.135	0.213	0.329
107Ag	0.001	0.003	0.067	0.036	0.133	0.120	0.065
111Cd	0.052	0.173	1.2	1.1	1.5	2.4	3.4
118Sn	0.017	0.057	0.141	0.130	0.055	0.352	0.280
121Sb	0.003	0.010	0.036	0.041	0.022	0.064	0.151
137Ba	0.001	0.003	12	5.4	5.5	13	13
202Hg	0.019	0.063	0.059	0.050	0.045	0.059	0.068
205Tl	0.001	0.003	0.011	0.009	0.009	0.012	0.024
208Pb	0.001	0.003	0.066	0.031	0.022	0.055	0.095
238U	0.001	0.003	0.028	0.013	0.013	0.037	0.056

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FRUL_INV-1_2022-09-10_N	RG_FRUL_INV-2_2022-09-10_N	RG_FRUL_INV-3_2022-09-10_N	RG_FRUL_COMPOLI-4_2022-09-10_N	RG_FRUL_INV-5_2022-09-10_N
		Lab ID	357	358	359	360	361
		Wet Weight (g)	1.0009	0.7463	1.6798	1.1183	0.5437
		Dry Weight (g)	0.2191	0.1723	0.3958	0.2516	0.1203
		Moisture (%)	78.1	76.9	76.4	77.5	77.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.017	0.057	1.2	0.384	0.462	0.959	0.739
11B	0.090	0.300	0.334	0.902	0.301	1.2	0.868
23Na	11	37	4,442	2,912	2,666	4,401	3,643
24Mg	0.082	0.273	1,278	1,382	1,287	1,732	1,324
27Al	0.070	0.233	99	176	71	416	234
31P	82	273	9,161	9,587	9,841	11,820	8,357
39K	2.9	9.7	6,169	9,003	6,319	9,856	8,509
44Ca	22	73	1,448	2,253	1,824	2,662	2,326
49Ti	0.001	0.003	5.7	10	3.6	33	20
51V	0.032	0.107	0.160	0.265	0.145	0.734	0.397
52Cr	0.055	0.183	2.2	3.1	1.8	6.5	2.6
55Mn	0.008	0.027	20	48	19	37	49
57Fe	0.766	2.6	88	170	96	304	209
59Co	0.012	0.040	0.342	1.5	0.713	1.1	1.4
60Ni	0.015	0.050	3.2	11	4.6	13	8.4
63Cu	0.020	0.067	10	14	11	19	14
66Zn	0.253	0.843	164	266	428	288	185
75As	0.385	1.3	<0.385	0.935	0.468	0.788	0.788
77Se	0.368	1.2	7.7	9.8	6.9	9.6	10
88Sr	0.001	0.003	1.6	2.7	1.6	3.3	2.9
95Mo	0.001	0.003	0.135	0.193	0.135	0.271	0.309
107Ag	0.001	0.003	0.096	0.138	0.125	0.151	0.151
111Cd	0.052	0.173	1.6	1.7	1.6	1.5	2.1
118Sn	0.017	0.057	0.097	0.212	0.072	0.343	0.401
121Sb	0.003	0.010	0.011	0.027	0.016	0.043	0.045
137Ba	0.001	0.003	7.5	13	7.1	21	17
202Hg	0.019	0.063	0.063	0.061	0.072	0.059	0.059
205Tl	0.001	0.003	0.007	0.011	0.006	0.021	0.014
208Pb	0.001	0.003	0.041	0.089	0.029	0.152	0.126
238U	0.001	0.003	0.012	0.035	0.015	0.051	0.052

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FRUL_INVOLI-4_2022-09-10_N	RG_LCUT_INV-1_2022-09-15_N	RG_LCUT_INV-2_2022-09-15_N	RG_LCUT_INV-3_2022-09-15_N	RG_LCUT_INV-4_2022-09-15_N
		Lab ID	362	363	364	365	366
		Wet Weight (g)	0.0589	0.9922	0.8095	1.2195	0.8924
		Dry Weight (g)	0.0242	0.2211	0.2256	0.2690	0.2286
		Moisture (%)	58.9	77.7	72.1	77.9	74.4
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.017	0.057	3.8	0.585	0.390	0.311	0.377
11B	0.090	0.300	12	1.2	0.735	0.768	0.468
23Na	11	37	3,393	2,946	2,812	2,088	2,998
24Mg	0.082	0.273	2,537	1,168	844	726	946
27Al	0.070	0.233	7,808	576	213	139	162
31P	82	273	10,206	10,503	10,100	7,851	11,246
39K	2.9	9.7	13,934	8,514	9,077	7,370	8,025
44Ca	22	73	14,095	2,395	981	1,463	1,086
49Ti	0.001	0.003	663	39	10	7.6	10
51V	0.032	0.107	12	0.839	0.309	0.210	0.260
52Cr	0.055	0.183	18	5.7	2.3	2.1	2.3
55Mn	0.008	0.027	148	18	18	12	19
57Fe	0.766	2.6	3,694	254	107	73	119
59Co	0.012	0.040	4.3	0.946	0.445	0.280	0.713
60Ni	0.015	0.050	34	14	4.6	3.6	4.5
63Cu	0.020	0.067	14	14	15	12	17
66Zn	0.253	0.843	211	172	133	93	150
75As	0.385	1.3	6.5	0.812	0.492	0.394	0.566
77Se	0.368	1.2	65	5.9	5.4	4.5	6.4
88Sr	0.001	0.003	18	3.7	1.6	2.0	1.9
95Mo	0.001	0.003	0.851	0.174	0.232	0.116	0.232
107Ag	0.001	0.003	0.113	0.022	0.009	0.009	0.013
111Cd	0.052	0.173	10	1.9	1.6	1.1	2.4
118Sn	0.017	0.057	0.653	0.199	0.170	0.111	0.200
121Sb	0.003	0.010	0.250	0.047	0.027	0.015	0.024
137Ba	0.001	0.003	215	25	17	8.2	13
202Hg	0.019	0.063	0.168	0.177	0.149	0.084	0.154
205Tl	0.001	0.003	0.156	0.030	0.025	0.014	0.019
208Pb	0.001	0.003	2.2	0.233	0.148	0.101	0.133
238U	0.001	0.003	0.393	0.078	0.044	0.030	0.052

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LCUT_INV-5_2022-09-15_N	RG_LIDCOM_INV-1_2022-09-12_N	RG_LIDCOM_INV-2_2022-09-12_N	RG_LIDCOM_INV-3_2022-09-12_N	RG_LIDCOM_INV-4_2022-09-13_N
		Lab ID	367	368	369	370	371
		Wet Weight (g)	1.3036	2.0104	3.2354	1.0732	1.6366
		Dry Weight (g)	0.3271	0.4390	0.7260	0.2676	0.3923
		Moisture (%)	74.9	78.2	77.6	75.1	76.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.017	0.057	0.465	0.535	0.568	0.284	0.346
11B	0.090	0.300	0.735	0.768	0.685	0.359	0.490
23Na	11	37	3,274	3,478	4,925	2,994	2,920
24Mg	0.082	0.273	1,048	1,183	1,209	863	947
27Al	0.070	0.233	146	447	360	99	74
31P	82	273	11,209	10,575	14,475	10,931	11,321
39K	2.9	9.7	8,672	9,810	13,366	7,599	7,274
44Ca	22	73	1,024	1,315	1,053	816	816
49Ti	0.001	0.003	8.8	39	24	5.4	5.8
51V	0.032	0.107	0.240	0.395	0.464	0.159	0.107
52Cr	0.055	0.183	2.3	3.0	2.3	2.6	2.6
55Mn	0.008	0.027	20	48	69	55	39
57Fe	0.766	2.6	110	154	190	118	64
59Co	0.012	0.040	0.492	0.638	0.615	0.675	0.450
60Ni	0.015	0.050	4.5	8.5	11	7.8	7.7
63Cu	0.020	0.067	15	7.3	7.5	10	7.5
66Zn	0.253	0.843	162	153	170	242	168
75As	0.385	1.3	0.615	0.517	0.720	0.546	0.472
77Se	0.368	1.2	6.3	5.8	5.4	5.2	4.4
88Sr	0.001	0.003	1.7	2.9	1.9	1.4	1.1
95Mo	0.001	0.003	0.232	0.232	0.206	0.216	0.176
107Ag	0.001	0.003	0.013	0.013	0.014	0.023	0.009
111Cd	0.052	0.173	2.1	0.961	1.4	2.3	1.2
118Sn	0.017	0.057	0.041	0.244	0.165	0.098	0.084
121Sb	0.003	0.010	0.031	0.033	0.022	0.015	0.013
137Ba	0.001	0.003	19	15	22	12	8.0
202Hg	0.019	0.063	0.145	0.072	0.066	0.079	0.053
205Tl	0.001	0.003	0.023	0.019	0.032	0.019	0.017
208Pb	0.001	0.003	0.152	0.145	0.103	0.050	0.037
238U	0.001	0.003	0.061	0.046	0.045	0.035	0.016

Notes:

ppm = parts per million

DL = detection limit

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LIDCOM_INV-5_2022-09-13_N	RG_LIDSL_INV-1_2022-09-13_N	RG_LIDSL_INV-2_2022-09-13_N	RG_LIDSL_INV-3_2022-09-13_N	RG_LIDSL_INV-4_2022-09-14_N
		Lab ID	372	373	374	375	376
		Wet Weight (g)	2.1208	1.4813	2.0242	3.2350	1.8286
		Dry Weight (g)	0.4242	0.3078	0.4195	0.6606	0.3868
		Moisture (%)	80.0	79.2	79.3	79.6	78.8
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.017	0.057	0.398	0.419	0.428	0.475	0.357
11B	0.090	0.300	0.685	0.685	0.751	0.718	0.424
23Na	11	37	3,901	4,562	4,107	4,461	3,278
24Mg	0.082	0.273	1,133	1,771	1,231	1,102	1,330
27Al	0.070	0.233	135	82	221	133	30
31P	82	273	11,788	12,797	12,021	9,719	12,292
39K	2.9	9.7	9,872	10,912	9,404	8,448	9,610
44Ca	22	73	1,267	2,118	1,916	1,294	1,182
49Ti	0.001	0.003	10	6.4	15	7.5	1.7
51V	0.032	0.107	0.167	0.185	0.386	0.256	0.094
52Cr	0.055	0.183	2.1	2.9	2.4	2.0	1.5
55Mn	0.008	0.027	75	76	84	67	79
57Fe	0.766	2.6	129	198	289	168	132
59Co	0.012	0.040	0.751	2.6	1.1	1.1	1.6
60Ni	0.015	0.050	11	15	10	8.4	10
63Cu	0.020	0.067	13	23	16	8.5	17
66Zn	0.253	0.843	265	423	267	189	243
75As	0.385	1.3	0.596	0.906	0.546	0.521	0.683
77Se	0.368	1.2	6.8	11	9.0	5.2	7.6
88Sr	0.001	0.003	1.9	3.4	2.7	1.8	1.7
95Mo	0.001	0.003	0.255	0.333	0.294	0.196	0.274
107Ag	0.001	0.003	0.018	0.037	0.027	0.009	0.018
111Cd	0.052	0.173	1.8	6.9	3.3	3.3	4.2
118Sn	0.017	0.057	0.090	0.581	0.291	0.128	0.268
121Sb	0.003	0.010	0.023	0.030	0.030	0.022	0.015
137Ba	0.001	0.003	15	9.3	26	7.9	9.2
202Hg	0.019	0.063	0.071	0.115	0.106	0.057	0.093
205Tl	0.001	0.003	0.035	0.053	0.030	0.026	0.024
208Pb	0.001	0.003	0.081	0.070	0.145	0.063	0.044
238U	0.001	0.003	0.063	0.064	0.079	0.039	0.035

Notes:

ppm = parts per million

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% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LIDSL_INV-5_2022-09-14_N	RG_LILC3_INV-1_2022-09-08_N	RG_LILC3_INV-2_2022-09-08_N	RG_LILC3_INV-3_2022-09-08_N	RG_LILC3_INV-4_2022-09-08_N
		Lab ID	377	378	379	380	381
		Wet Weight (g)	2.1710	0.7350	0.4631	0.7118	0.6537
		Dry Weight (g)	0.5002	0.1447	0.1159	0.1530	0.1291
		Moisture (%)	77.0	80.3	75.0	78.5	80.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.017	0.057	0.343	0.346	0.346	0.381	0.393
11B	0.090	0.300	0.457	0.473	0.326	0.522	0.751
23Na	11	37	3,726	2,986	3,782	3,426	4,025
24Mg	0.082	0.273	1,164	822	1,096	858	1,027
27Al	0.070	0.233	135	70	44	72	166
31P	82	273	11,726	8,752	11,347	11,885	11,983
39K	2.9	9.7	9,976	7,004	9,869	8,705	9,363
44Ca	22	73	1,325	735	1,249	1,011	1,204
49Ti	0.001	0.003	7.9	4.4	2.5	3.7	8.7
51V	0.032	0.107	0.237	0.188	0.185	0.214	0.344
52Cr	0.055	0.183	2.1	2.2	2.1	2.0	2.7
55Mn	0.008	0.027	75	44	90	68	77
57Fe	0.766	2.6	237	159	262	296	307
59Co	0.012	0.040	1.8	0.787	0.844	1.1	1.5
60Ni	0.015	0.050	9.1	7.7	6.9	9.2	9.5
63Cu	0.020	0.067	18	12	17	14	12
66Zn	0.253	0.843	368	164	140	151	127
75As	0.385	1.3	0.832	0.571	0.447	0.559	0.447
77Se	0.368	1.2	7.8	9.2	8.0	10	9.0
88Sr	0.001	0.003	2.0	1.1	2.2	1.5	1.8
95Mo	0.001	0.003	0.314	0.294	0.294	0.255	0.235
107Ag	0.001	0.003	0.023	0.007	0.009	0.009	0.014
111Cd	0.052	0.173	5.1	0.688	1.5	1.7	1.6
118Sn	0.017	0.057	0.472	0.115	0.122	0.143	0.293
121Sb	0.003	0.010	0.018	0.028	0.032	0.031	0.028
137Ba	0.001	0.003	12	5.4	8.4	8.6	9.3
202Hg	0.019	0.063	0.099	0.119	0.088	0.101	0.115
205Tl	0.001	0.003	0.027	0.022	0.017	0.029	0.022
208Pb	0.001	0.003	0.068	0.050	0.068	0.085	0.125
238U	0.001	0.003	0.043	0.023	0.080	0.059	0.048

Notes:

ppm = parts per million

DL = detection limit

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% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LILC3_INV-5_2022-09-08_N	RG_LISP24_INV-2_2022-09-15_N	RG_LISP24_INV-1_2022-09-14_N	RG_LISP24_INV-4_2022-09-15_N	RG_LISP24_INV-5_2022-09-15_N
		Lab ID	382	383	384	385	386
		Wet Weight (g)	0.8016	0.7643	1.4952	1.2758	0.6828
		Dry Weight (g)	0.1510	0.1858	0.3551	0.2749	0.1605
		Moisture (%)	81.2	75.7	76.3	78.5	76.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.017	0.057	0.551	0.346	0.413	0.346	0.443
11B	0.090	0.300	0.783	0.814	0.457	0.457	0.303
23Na	11	37	4,412	3,579	4,634	3,723	4,316
24Mg	0.082	0.273	1,081	1,199	1,391	1,007	1,311
27Al	0.070	0.233	131	218	67	90	68
31P	82	273	12,266	12,024	15,476	11,363	16,808
39K	2.9	9.7	9,992	9,296	10,737	9,164	10,378
44Ca	22	73	1,349	1,264	806	810	889
49Ti	0.001	0.003	7.9	13	3.9	5.4	3.3
51V	0.032	0.107	0.344	0.396	0.128	0.229	0.164
52Cr	0.055	0.183	2.3	2.1	1.8	2.0	2.2
55Mn	0.008	0.027	60	72	43	64	88
57Fe	0.766	2.6	309	328	166	262	163
59Co	0.012	0.040	0.913	1.4	0.751	1.1	0.621
60Ni	0.015	0.050	7.0	11	3.9	8.0	4.9
63Cu	0.020	0.067	15	10	11	11	16
66Zn	0.253	0.843	152	207	195	197	287
75As	0.385	1.3	0.484	0.645	0.621	0.497	0.717
77Se	0.368	1.2	9.2	8.2	8.8	6.7	7.7
88Sr	0.001	0.003	2.2	2.2	1.4	1.4	2.5
95Mo	0.001	0.003	0.333	0.274	0.372	0.294	0.343
107Ag	0.001	0.003	0.014	0.014	0.014	0.014	0.023
111Cd	0.052	0.173	1.2	1.8	1.6	1.9	0.977
118Sn	0.017	0.057	0.193	0.502	0.109	0.303	0.139
121Sb	0.003	0.010	0.033	0.031	0.018	0.017	0.013
137Ba	0.001	0.003	9.4	10	7.7	9.3	19
202Hg	0.019	0.063	0.115	0.084	0.088	0.075	0.124
205Tl	0.001	0.003	0.028	0.023	0.025	0.022	0.024
208Pb	0.001	0.003	0.102	0.085	0.041	0.062	0.040
238U	0.001	0.003	0.040	0.039	0.021	0.046	0.026

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_SLINE_INV-1_2022-09-16_N	RG_SLINE_INV-2_2022-09-16_N	RG_SLINE_INV-3_2022-09-16_N	RG_SLINE_INV-4_2022-09-16_N	RG_SLINE_INV-5_2022-09-16_N
		Lab ID	387	388	389	390	391
		Wet Weight (g)	0.6443	1.5266	1.1253	0.7992	0.9909
		Dry Weight (g)	0.1230	0.2571	0.2462	0.1397	0.1924
		Moisture (%)	80.9	83.2	78.1	82.5	80.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.017	0.057	0.411	0.157	0.294	0.392	0.298
11B	0.090	0.300	0.889	0.283	0.566	0.889	0.606
23Na	11	37	4,635	2,864	4,072	3,326	3,532
24Mg	0.082	0.273	1,697	1,043	1,551	1,632	1,559
27Al	0.070	0.233	359	76	249	399	240
31P	82	273	16,185	11,619	14,177	12,677	13,075
39K	2.9	9.7	15,031	9,064	12,679	11,537	10,358
44Ca	22	73	3,042	1,281	1,927	2,965	2,361
49Ti	0.001	0.003	23	3.8	13	27	15
51V	0.032	0.107	0.882	0.273	0.625	0.953	0.504
52Cr	0.055	0.183	3.7	2.3	3.1	2.7	2.5
55Mn	0.008	0.027	24	13	17	19	13
57Fe	0.766	2.6	253	73	193	294	172
59Co	0.012	0.040	0.625	0.136	0.273	0.507	0.227
60Ni	0.015	0.050	7.1	2.8	6.0	4.7	3.5
63Cu	0.020	0.067	16	9.0	15	16	16
66Zn	0.253	0.843	557	285	307	613	322
75As	0.385	1.3	1.6	0.810	1.3	1.2	0.561
77Se	0.368	1.2	8.3	3.9	5.4	12	5.2
88Sr	0.001	0.003	7.3	2.9	4.1	5.5	4.3
95Mo	0.001	0.003	0.422	0.211	0.343	0.395	0.237
107Ag	0.001	0.003	0.098	0.045	0.076	0.068	0.091
111Cd	0.052	0.173	3.7	1.1	1.5	2.5	1.6
118Sn	0.017	0.057	0.463	0.241	0.334	0.324	0.197
121Sb	0.003	0.010	0.024	0.009	0.014	0.022	0.016
137Ba	0.001	0.003	18	12	18	16	14
202Hg	0.019	0.063	0.118	0.087	0.081	0.115	0.099
205Tl	0.001	0.003	0.105	0.045	0.058	0.082	0.058
208Pb	0.001	0.003	0.167	0.038	0.113	0.215	0.130
238U	0.001	0.003	0.098	0.037	0.040	0.090	0.068

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LISP24_INV-3_2022-09-15_N	RG_LI24_INV-1_2022-09-17_N	RG_LI24_INV-2_2022-09-17_N	RG_LI24_INV-3_2022-09-17_N	RG_LI24_INV-4_2022-09-17_N
		Lab ID	392	393	394	395	396
		Wet Weight (g)	0.6704	0.4610	0.7245	0.6050	0.4372
		Dry Weight (g)	0.1485	0.0846	0.1257	0.1245	0.0661
		Moisture (%)	77.8	81.6	82.7	79.4	84.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.017	0.057	0.384	0.988	0.549	0.819	0.298
11B	0.090	0.300	0.929	2.1	1.4	1.4	0.606
23Na	11	37	3,043	3,604	4,106	3,791	3,319
24Mg	0.082	0.273	1,394	1,578	1,532	1,775	1,252
27Al	0.070	0.233	130	491	243	483	137
31P	82	273	12,220	12,068	14,045	15,024	14,363
39K	2.9	9.7	9,343	10,707	10,965	11,529	9,032
44Ca	22	73	1,523	4,265	3,169	2,910	2,627
49Ti	0.001	0.003	9.0	27	15	24	7.1
51V	0.032	0.107	0.476	2.5	1.9	2.0	0.718
52Cr	0.055	0.183	2.6	3.8	3.3	8.3	2.9
55Mn	0.008	0.027	67	18	13	18	11
57Fe	0.766	2.6	284	297	210	357	156
59Co	0.012	0.040	1.1	0.712	0.462	0.606	0.314
60Ni	0.015	0.050	9.3	11	11	15	6.3
63Cu	0.020	0.067	15	12	13	13	9.6
66Zn	0.253	0.843	178	434	318	344	268
75As	0.385	1.3	0.608	2.6	3.0	2.8	2.3
77Se	0.368	1.2	6.0	6.8	6.2	7.2	6.6
88Sr	0.001	0.003	2.2	10	6.8	6.5	4.9
95Mo	0.001	0.003	0.290	0.422	0.369	0.409	0.316
107Ag	0.001	0.003	0.015	0.053	0.079	0.076	0.042
111Cd	0.052	0.173	1.6	1.2	0.833	0.849	0.673
118Sn	0.017	0.057	0.272	0.883	0.599	0.389	0.742
121Sb	0.003	0.010	0.020	0.054	0.039	0.047	0.016
137Ba	0.001	0.003	10	25	16	25	13
202Hg	0.019	0.063	0.074	0.074	0.062	0.081	0.056
205Tl	0.001	0.003	0.028	0.055	0.054	0.062	0.048
208Pb	0.001	0.003	0.081	0.195	0.140	0.221	0.079
238U	0.001	0.003	0.039	0.400	0.084	0.127	0.063

Notes:

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% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LI24_INV-5_2022-09-17_N	RG_LI8_INV-1_2022-09-17_N	RG_LI8_INV-2_2022-09-17_N	RG_LI8_INV-3_2022-09-17_N	RG_LI8_INV-4_2022-09-17_N
		Lab ID	397	398	399	400	401
		Wet Weight (g)	0.8207	1.4904	2.8631	2.0220	1.4720
		Dry Weight (g)	0.1587	0.3349	0.5908	0.4141	0.2899
		Moisture (%)	80.7	77.5	79.4	79.5	80.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.017	0.057	0.212	0.329	0.384	0.768	0.619
11B	0.090	0.300	0.364	0.566	0.586	0.727	0.485
23Na	11	37	2,808	1,928	2,376	4,135	4,055
24Mg	0.082	0.273	1,366	771	762	1,978	1,131
27Al	0.070	0.233	60	163	136	171	158
31P	82	273	12,143	6,982	8,935	15,160	11,672
39K	2.9	9.7	7,472	6,296	8,316	10,402	8,254
44Ca	22	73	2,142	1,008	654	2,799	1,233
49Ti	0.001	0.003	3.1	9.0	5.9	27	9.2
51V	0.032	0.107	0.468	0.254	0.203	0.683	0.304
52Cr	0.055	0.183	2.3	1.7	1.9	2.7	1.9
55Mn	0.008	0.027	7.9	21	34	85	32
57Fe	0.766	2.6	106	78	60	176	119
59Co	0.012	0.040	0.197	0.284	0.257	0.613	0.405
60Ni	0.015	0.050	5.6	4.0	3.6	9.7	5.5
63Cu	0.020	0.067	12	7.1	5.2	13	10
66Zn	0.253	0.843	199	219	202	418	258
75As	0.385	1.3	1.7	<0.385	<0.385	0.685	0.483
77Se	0.368	1.2	4.7	3.9	4.4	7.5	7.0
88Sr	0.001	0.003	5.2	1.7	0.908	1.3	1.9
95Mo	0.001	0.003	0.237	0.132	0.105	0.316	0.264
107Ag	0.001	0.003	0.053	0.015	0.008	0.023	0.023
111Cd	0.052	0.173	0.609	1.5	1.9	2.6	1.6
118Sn	0.017	0.057	0.228	0.156	0.316	0.183	0.145
121Sb	0.003	0.010	0.010	0.011	0.009	0.025	0.012
137Ba	0.001	0.003	10	7.5	4.3	6.1	12
202Hg	0.019	0.063	0.050	0.056	0.043	0.099	0.093
205Tl	0.001	0.003	0.046	0.014	0.015	0.024	0.014
208Pb	0.001	0.003	0.050	0.053	0.041	0.122	0.068
238U	0.001	0.003	0.069	0.025	0.018	0.064	0.027

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LI8_INV-5_2022-09-17_N
		Lab ID	402
		Wet Weight (g)	1.7830
		Dry Weight (g)	0.3246
		Moisture (%)	81.8
Parameter	DL (ppm)	LOQ (ppm)	(ppm)
7Li	0.017	0.057	0.525
11B	0.090	0.300	0.485
23Na	11	37	2,642
24Mg	0.082	0.273	966
27Al	0.070	0.233	165
31P	82	273	8,375
39K	2.9	9.7	6,146
44Ca	22	73	712
49Ti	0.001	0.003	12
51V	0.032	0.107	0.312
52Cr	0.055	0.183	2.0
55Mn	0.008	0.027	22
57Fe	0.766	2.6	102
59Co	0.012	0.040	0.291
60Ni	0.015	0.050	6.1
63Cu	0.020	0.067	7.4
66Zn	0.253	0.843	224
75As	0.385	1.3	0.436
77Se	0.368	1.2	4.6
88Sr	0.001	0.003	1.4
95Mo	0.001	0.003	0.185
107Ag	0.001	0.003	0.015
111Cd	0.052	0.173	1.8
118Sn	0.017	0.057	0.115
121Sb	0.003	0.010	0.014
137Ba	0.001	0.003	11
202Hg	0.019	0.063	0.081
205Tl	0.001	0.003	0.014
208Pb	0.001	0.003	0.060
238U	0.001	0.003	0.017

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_FO23_INV-1_2022-09-09_N			RG_FO23_INV-5_2022-09-10_N			RG_LIDSL_INV-1_2022-09-13_N		
Lab ID		352			356			373		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.017	0.490	0.535	8.8	0.478	0.453	5.4	0.419	0.334	23
11B	0.090	0.802	0.868	-	0.902	1.2	28	0.685	0.702	-
23Na	11	2,551	2,813	9.8	3,934	3,095	24	4,562	3,823	18
24Mg	0.082	1,299	1,423	9.1	1,737	1,657	4.7	1,771	1,557	13
27Al	0.070	132	160	19	159	195	20	82	76	7.6
31P	82	10,605	11,011	3.8	13,643	11,466	17	12,797	12,217	4.6
39K	2.9	7,179	9,243	25	11,945	10,308	15	10,912	8,939	20
44Ca	22	1,932	2,234	15	2,619	2,851	8.5	2,118	1,831	15
49Ti	0.001	11	8.6	25	12	8.8	31	6.4	4.9	27
51V	0.032	0.230	0.274	-	0.255	0.304	-	0.185	0.172	-
52Cr	0.055	2.9	3.6	22	2.4	2.1	13	2.9	2.1	32
55Mn	0.008	22	23	4.4	64	81	23	76	75	1.3
57Fe	0.766	129	134	3.8	174	230	28	198	218	9.6
59Co	0.012	0.955	1.0	4.6	3.0	2.9	3.4	2.6	2.1	21
60Ni	0.015	6.3	7.3	15	19	18	5.4	15	13	14
63Cu	0.020	13	13	0.0	13	13	0.0	23	19	19
66Zn	0.253	318	402	23	351	421	18	423	422	0.2
75As	0.385	0.480	0.492	-	1.5	1.3	-	0.906	0.695	-
77Se	0.368	8.1	6.6	20	11	11	0.0	11	8.2	29
88Sr	0.001	2.7	3.2	17	4.0	3.9	2.5	3.4	3.1	9.2
95Mo	0.001	0.193	0.222	14	0.329	0.464	34	0.333	0.235	35
107Ag	0.001	0.067	0.067	0.0	0.065	0.089	31	0.037	0.030	21
111Cd	0.052	1.2	1.6	29	3.4	3.4	0.0	6.9	4.8	36
118Sn	0.017	0.141	0.150	-	0.280	0.334	18	0.581	0.439	28
121Sb	0.003	0.036	0.027	-	0.151	0.203	29	0.030	0.016	-
137Ba	0.001	12	12	0.0	13	16	21	9.3	11	17
202Hg	0.019	0.059	0.063	-	0.068	0.068	-	0.115	0.093	-
205Tl	0.001	0.011	0.012	8.7	0.024	0.021	13	0.053	0.039	30
208Pb	0.001	0.066	0.061	7.9	0.095	0.126	28	0.070	0.088	23
238U	0.001	0.028	0.029	3.5	0.056	0.055	1.8	0.064	0.077	18

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_LIDSL_INV-5_2022-09-14_N			RG_SLINE_INV-4_2022-09-16_N			RG_LI24_INV-2_2022-09-17_N		
Lab ID		377			390			394		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.017	0.343	0.331	3.6	0.392	0.341	14	0.549	0.409	29
11B	0.090	0.457	0.685	-	0.889	0.768	-	1.4	0.970	36
23Na	11	3,726	3,445	7.8	3,326	4,096	21	4,106	3,297	22
24Mg	0.082	1,164	1,435	21	1,632	1,707	4.5	1,532	1,500	2.1
27Al	0.070	135	93	37	399	282	34	243	182	29
31P	82	11,726	11,507	1.9	12,677	15,182	18	14,045	12,290	13
39K	2.9	9,976	8,210	19	11,537	12,940	12	10,965	9,082	19
44Ca	22	1,325	1,253	5.6	2,965	2,122	33	3,169	2,763	14
49Ti	0.001	7.9	8.2	3.7	27	20	30	15	11	31
51V	0.032	0.237	0.183	-	0.953	0.703	30	1.9	1.4	30
52Cr	0.055	2.1	2.1	0.0	2.7	2.6	3.8	3.3	2.4	32
55Mn	0.008	75	72	4.1	19	19	0.0	13	11	17
57Fe	0.766	237	200	17	294	250	16	210	199	5.4
59Co	0.012	1.8	1.9	5.4	0.507	0.477	6.1	0.462	0.454	1.7
60Ni	0.015	9.1	11	19	4.7	4.8	2.1	11	8.5	26
63Cu	0.020	18	15	18	16	18	12	13	12	8.0
66Zn	0.253	368	312	17	613	566	8.0	318	320	0.6
75As	0.385	0.832	0.857	-	1.2	1.2	-	3.0	2.8	-
77Se	0.368	7.8	8.5	8.6	12	8.2	38	6.2	6.5	4.7
88Sr	0.001	2.0	2.2	9.5	5.5	4.7	16	6.8	6.0	13
95Mo	0.001	0.314	0.333	5.9	0.395	0.527	29	0.369	0.290	24
107Ag	0.001	0.023	0.018	24	0.068	0.068	0.0	0.079	0.057	32
111Cd	0.052	5.1	4.3	17	2.5	2.0	22	0.833	0.673	21
118Sn	0.017	0.472	0.335	34	0.324	0.254	24	0.599	0.623	3.9
121Sb	0.003	0.018	0.018	-	0.022	0.018	-	0.039	0.020	-
137Ba	0.001	12	10	18	16	14	13	16	15	6.5
202Hg	0.019	0.099	0.093	-	0.115	0.108	-	0.062	0.050	-
205Tl	0.001	0.027	0.031	14	0.082	0.083	1.2	0.054	0.042	25
208Pb	0.001	0.068	0.065	4.5	0.215	0.151	35	0.140	0.095	38
238U	0.001	0.043	0.048	11	0.090	0.081	11	0.084	0.074	13

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

		Sample Group ID	01			02		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.017	1.21	1.3	107	0.0	1.1	94	10
11B	0.090	4.5	4.6	102	3.4	4.0	90	2.8
23Na	11	14,000	14,039	100	4.1	13,597	97	4.7
24Mg	0.082	910	982	108	5.0	893	98	12
27Al	0.070	197.2	182	92	6.4	176	90	5.0
31P	82	8,000	8,046	101	5.6	7,757	97	6.4
39K	2.9	15,500	16,412	106	4.1	14,828	96	2.6
44Ca	22	2,360	2,378	101	3.9	2,245	95	5.9
49Ti	0.001	12.24	11	92	4.0	10	85	10
51V	0.032	1.57	1.5	96	9.4	1.5	97	5.5
52Cr	0.055	1.87	1.8	98	6.2	1.9	103	6.8
55Mn	0.008	3.17	3.6	112	12	3.1	99	7.7
57Fe	0.766	343	370	108	5.7	339	99	5.5
59Co	0.012	0.25	0.276	110	6.7	0.258	103	7.6
60Ni	0.015	1.34	1.4	108	6.2	1.4	103	6.1
63Cu	0.020	15.7	16	102	4.4	16	102	7.7
66Zn	0.253	51.6	52	101	7.7	49	95	6.8
75As	0.385	6.87	7.0	101	4.1	6.7	98	4.9
77Se	0.368	3.45	3.2	92	4.1	3.5	103	8.8
88Sr	0.001	10.1	10	102	11	9.8	97	1.8
95Mo	0.001	0.29	0.286	99	5.6	0.274	95	10
107Ag	0.001	0.0252	0.026	104	17	0.026	104	6.8
111Cd	0.052	0.299	0.285	96	4.7	0.322	108	15
118Sn	0.017	0.061	0.061	100	12	0.062	102	13
121Sb	0.003	0.011	0.011	102	19	0.011	103	5.1
137Ba	0.001	8.6	8.5	99	2.2	7.5	87	2.2
202Hg	0.019	0.412	0.423	103	5.8	0.424	103	8.0
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.001	0.404	0.408	101	8.7	0.408	101	8.0
238U	0.001	0.05	0.050	100	11	0.051	102	11

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	03	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.017	1.21	1.2	101	11
11B	0.090	4.5	4.6	101	5.3
23Na	11	14,000	14,337	102	6.1
24Mg	0.082	910	967	106	4.0
27Al	0.070	197.2	191	97	2.7
31P	82	8,000	8,412	105	6.9
39K	2.9	15,500	16,751	108	7.2
44Ca	22	2,360	2,635	112	5.1
49Ti	0.001	12.24	13	105	12
51V	0.032	1.57	1.7	108	4.2
52Cr	0.055	1.87	2.0	108	4.1
55Mn	0.008	3.17	3.4	108	3.2
57Fe	0.766	343	368	107	3.0
59Co	0.012	0.25	0.289	116	6.6
60Ni	0.015	1.34	1.4	106	5.9
63Cu	0.020	15.7	17	111	3.1
66Zn	0.253	51.6	55	107	4.8
75As	0.385	6.87	7.1	103	2.0
77Se	0.368	3.45	3.7	107	5.8
88Sr	0.001	10.1	11	109	6.4
95Mo	0.001	0.29	0.306	105	4.7
107Ag	0.001	0.0252	0.032	125	11
111Cd	0.052	0.299	0.367	123	12
118Sn	0.017	0.061	0.058	96	7.4
121Sb	0.003	0.011	0.011	100	13
137Ba	0.001	8.6	8.6	100	2.2
202Hg	0.019	0.412	0.468	114	2.2
205Tl	0.001	0.0013	-	-	-
208Pb	0.001	0.404	0.418	104	17
238U	0.001	0.05	0.052	104	10

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_FO23_INV-1_2022-09-09_N	352	30 Sep 2022
	RG_FO23_INV-2_2022-09-09_N	353	
	RG_FO23_INV-3_2022-09-09_N	354	
	RG_FO23_INV-4_2022-09-09_N	355	
	RG_FO23_INV-5_2022-09-10_N	356	
	RG_FRUL_INV-1_2022-09-10_N	357	
	RG_FRUL_INV-2_2022-09-10_N	358	
	RG_FRUL_INV-3_2022-09-10_N	359	
	RG_FRUL_COMPOLI-4_2022-09-10_N	360	
	RG_FRUL_INV-5_2022-09-10_N	361	
	RG_FRUL_INVOLI-4_2022-09-10_N	362	
	RG_LCUT_INV-1_2022-09-15_N	363	
	RG_LCUT_INV-2_2022-09-15_N	364	
	RG_LCUT_INV-3_2022-09-15_N	365	
	RG_LCUT_INV-4_2022-09-15_N	366	
	RG_LCUT_INV-5_2022-09-15_N	367	
	RG_LIDCOM_INV-1_2022-09-12_N	368	
02	RG_LIDCOM_INV-2_2022-09-12_N	369	30 Sep 2022
	RG_LIDCOM_INV-3_2022-09-12_N	370	
	RG_LIDCOM_INV-4_2022-09-13_N	371	
	RG_LIDCOM_INV-5_2022-09-13_N	372	
	RG_LIDSL_INV-1_2022-09-13_N	373	
	RG_LIDSL_INV-2_2022-09-13_N	374	
	RG_LIDSL_INV-3_2022-09-13_N	375	
	RG_LIDSL_INV-4_2022-09-14_N	376	
	RG_LIDSL_INV-5_2022-09-14_N	377	
	RG_LILC3_INV-1_2022-09-08_N	378	
	RG_LILC3_INV-2_2022-09-08_N	379	
	RG_LILC3_INV-3_2022-09-08_N	380	
	RG_LILC3_INV-4_2022-09-08_N	381	
	RG_LILC3_INV-5_2022-09-08_N	382	
	RG_LISP24_INV-2_2022-09-15_N	383	
	RG_LISP24_INV-1_2022-09-14_N	384	
	RG_LISP24_INV-4_2022-09-15_N	385	
03	RG_LISP24_INV-5_2022-09-15_N	386	30 Sep 2022
	RG_SLINE_INV-1_2022-09-16_N	387	
	RG_SLINE_INV-2_2022-09-16_N	388	
	RG_SLINE_INV-3_2022-09-16_N	389	
	RG_SLINE_INV-4_2022-09-16_N	390	
	RG_SLINE_INV-5_2022-09-16_N	391	

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
03	RG_LISP24_INV-3_2022-09-15_N	392	30 Sep 2022
	RG_LI24_INV-1_2022-09-17_N	393	
	RG_LI24_INV-2_2022-09-17_N	394	
	RG_LI24_INV-3_2022-09-17_N	395	
	RG_LI24_INV-4_2022-09-17_N	396	
	RG_LI24_INV-5_2022-09-17_N	397	
	RG_LI8_INV-1_2022-09-17_N	398	
	RG_LI8_INV-2_2022-09-17_N	399	
	RG_LI8_INV-3_2022-09-17_N	400	
	RG_LI8_INV-4_2022-09-17_N	401	
	RG_LI8_INV-5_2022-09-17_N	402	

Teck

COC ID: REP_LAEMP_LCO_2022-09_TRICH

TURNAROUND TIME:

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	TrichAnalytics Inc.			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Jennie Christensen			Email 1:	AquaSciLab@Teck.com	X	X	X
Email	Cybele.Heddle@teck.com			Email	jennie.christensen@trichanalytics			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	207-1753 Sean Heights			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	Lisa.Bowron@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Saanichton	Province	BC	Email 5:	Tyler.Mehler@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code				Email 6:	Hannah.Penner@Teck.com	X	X	X
Phone Number	1-250-865-3048			Phone Number				PO number	VPO00818999			

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Trich ID	Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	Filt.	PRESERV.	ANALYSIS	Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
352	RG_FO23_INV-1_2022-09-09_N	RG_FO23	TA		9-Sep-22	8:51	INV	Composite	Composite				1	X	X	X
353	RG_FO23_INV-2_2022-09-09_N	RG_FO23	TA		9-Sep-22	11:35	INV	Composite	Composite				1	X	X	X
354	RG_FO23_INV-3_2022-09-09_N	RG_FO23	TA		9-Sep-22	14:44	INV	Composite	Composite				1	X	X	X
355	RG_FO23_INV-4_2022-09-09_N	RG_FO23	TA		9-Sep-22	15:59	INV	Composite	Composite				1	X	X	X
356	RG_FO23_INV-5_2022-09-10_N	RG_FO23	TA		10-Sep-22	15:46	INV	Composite	Composite				1	X	X	X
357	RG_FRUL_INV-1_2022-09-10_N	RG_FRUL	TA		10-Sep-22	9:09	INV	Composite	Composite				1	X	X	X
358	RG_FRUL_INV-2_2022-09-10_N	RG_FRUL	TA		10-Sep-22	10:10	INV	Composite	Composite				1	X	X	X
359	RG_FRUL_INV-3_2022-09-10_N	RG_FRUL	TA		10-Sep-22	10:50	INV	Composite	Composite				1	X	X	X
360	RG_FRUL_COMPOLI-4_2022-09-10_N	RG_FRUL	TA		10-Sep-22	11:45	INV	COMPOLI	Composite				1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
PO 818999	Jennifer Ings	##########	Alex Wade	21Sep2022 / 14:57
				(Project # 2022-401)

SERVICE REQUEST (rush - subject to availability)

Regular (default)
Priority (2-3 business days) - 50% surcharge
Emergency (1 Business Day) - 100% surcharge
For Emergency <1 Day, ASAP or Weekend

Sampler's Name	Jennifer Ings	Mobile #	5195003444
Sampler's Signature		Date/Time	September 19, 2022

Teck

COC ID: REP_LAEMP_LCO_2022-09_TRICH

TURNAROUND TIME:

RUSH:

PROJECT/CLIENT INFO			
Facility Name / Job#	Regional Effects Program		
Project Manager	Cybele Heddle		
Email	Cybele.Heddle@teck.com		
Address	421 Pine Ave		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	1-250-865-3048		

LABORATORY			
Lab Name	TrichAnalytics Inc.		
Lab Contact	Jennie Christensen		
Email	jennie.christensen@trichanalytics		
Address	207-1753 Sean Heights		
City	Saanichton	Province	BC
Postal Code			
Phone Number			

OTHER INFO				
Report Format / Distribution		Excel	PDF	EDD
Email 1:	AquaSciLab@Teck.com	X	X	X
Email 2:	teckcoal@equisonline.com			X
Email 3:	Teck.Lab.Results@teck.com	X	X	X
Email 4:	Lisa.Bowron@minnow.ca	X	X	X
Email 5:	Tyler.Mehler@minnow.ca	X	X	X
Email 6:	Hannah.Penner@Teck.com	X	X	X
PO number	VPO00818999			

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Trich ID	Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	FIL	PRESERV.	ANALYSIS: Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
361	RG_FRUL_INV-5_2022-09-10_N	RG_FRUL	TA		10-Sep-22	12:10	INV	Composite	Composite			1	X	X	X
362	RG_FRUL_INVOLI-4_2022-09-10_N	RG_FRUL	TA		10-Sep-22	11:46	INV	INVOLI	Composite			1	X	X	X
363	RG_LCUT_INV-1_2022-09-15_N	RG_LCUT	TA		15-Sep-22	12:15	INV	Composite	Composite			1	X	X	X
364	RG_LCUT_INV-2_2022-09-15_N	RG_LCUT	TA		15-Sep-22	13:10	INV	Composite	Composite			1	X	X	X
365	RG_LCUT_INV-3_2022-09-15_N	RG_LCUT	TA		15-Sep-22	13:40	INV	Composite	Composite			1	X	X	X
366	RG_LCUT_INV-4_2022-09-15_N	RG_LCUT	TA		15-Sep-22	14:00	INV	Composite	Composite			1	X	X	X
367	RG_LCUT_INV-5_2022-09-15_N	RG_LCUT	TA		15-Sep-22	15:10	INV	Composite	Composite			1	X	X	X
368	RG_LIDCOM_INV-1_2022-09-12_N	RG_LIDCOM	TA		12-Sep-22	15:14	INV	Composite	Composite			1	X	X	X
369	RG_LIDCOM_INV-2_2022-09-12_N	RG_LIDCOM	TA		12-Sep-22	15:19	INV	Composite	Composite			1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
PO 818999	Jennifer Ings	##########	Alex Wade	21Sep2022 / 14:57
				(Project # 2022-401)

SERVICE REQUEST (rush - subject to availability)

Regular (default)
Priority (2-3 business days) - 50% surcharge
Emergency (1 Business Day) - 100% surcharge
For Emergency <1 Day, ASAP or Weekend

Sampler's Name	Jennifer Ings	Mobile #	5195003444
Sampler's Signature		Date/Time	September 19, 2022

Teck

COC ID: REP_LAEMP_LCO_2022-09_TRICH

TURNAROUND TIME:

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	TrichAnalytics Inc.			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Jennie Christensen			Email 1:	AquaSciLab@Teck.com	X	X	X
Email	Cybele.Heddle@teck.com			Email	jennie.christensen@trichanalytics			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	207-1753 Sean Heights			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	Lisa.Bowron@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Saanichton	Province	BC	Email 5:	Tyler.Mehler@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code				Email 6:	Hannah.Penner@Teck.com	X	X	X
Phone Number	1-250-865-3048			Phone Number				PO number	VPO00818999			

SAMPLE DETAILS — **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Incl. ID	Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	ANALYSIS: Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
	Filt.												
	PRESERV.												
370	RG_LIDCOM_INV-3_2022-09-12_N	RG_LIDCOM	TA		12-Sep-22	15:30	INV	Composite	Composite	1	X	X	X
371	RG_LIDCOM_INV-4_2022-09-13_N	RG_LIDCOM	TA		13-Sep-22	8:09	INV	Composite	Composite	1	X	X	X
372	RG_LIDCOM_INV-5_2022-09-13_N	RG_LIDCOM	TA		13-Sep-22	8:17	INV	Composite	Composite	1	X	X	X
373	RG_LIDSL_INV-1_2022-09-13_N	RG_LIDSL	TA		13-Sep-22	11:06	INV	Composite	Composite	1	X	X	X
374	RG_LIDSL_INV-2_2022-09-13_N	RG_LIDSL	TA		13-Sep-22	14:06	INV	Composite	Composite	1	X	X	X
375	RG_LIDSL_INV-3_2022-09-13_N	RG_LIDSL	TA		13-Sep-22	15:30	INV	Composite	Composite	1	X	X	X
376	RG_LIDSL_INV-4_2022-09-14_N	RG_LIDSL	TA		14-Sep-22	10:28	INV	Composite	Composite	1	X	X	X
377	RG_LIDSL_INV-5_2022-09-14_N	RG_LIDSL	TA		14-Sep-22	12:32	INV	Composite	Composite	1	X	X	X
378	RG_LILC3_INV-1_2022-09-08_N	RG_LILC3	TA		8-Sep-22	13:07	INV	Composite	Composite	1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
PO 818999	Jennifer Ings	##########	Alex Wade	21 Sep 2022 / 14:57
				(Project #: 2022-401)

SERVICE REQUEST (rush - subject to availability)

Regular (default)
Priority (2-3 business days) - 50% surcharge
Emergency (1 Business Day) - 100% surcharge
For Emergency <1 Day, ASAP or Weekend

Sampler's Name	Jennifer Ings	Mobile #	5195003444
Sampler's Signature		Date/Time	September 19, 2022

Teck

COC ID: REP_LAEMP_LCO_2022-09_TRICH

TURNAROUND TIME:

RUSH:

PROJECT/CLIENT INFO			
Facility Name / Job#	Regional Effects Program		
Project Manager	Cybele Heddle		
Email	Cybele.Heddle@teck.com		
Address	421 Pine Ave		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	1-250-865-3048		

LABORATORY			
Lab Name	TrichAnalytics Inc.		
Lab Contact	Jennie Christensen		
Email	jennie.christensen@trichanalytics		
Address	207-1753 Sean Heights		
City	Saanichton	Province	BC
Postal Code			
Phone Number			

OTHER INFO				
Report Format / Distribution		Excel	PDF	EDD
Email 1:	AquaSciLab@Teck.com	X	X	X
Email 2:	teckcoal@equisonline.com			X
Email 3:	Teck.Lab.Results@teck.com	X	X	X
Email 4:	Lisa.Bowron@minnow.ca	X	X	X
Email 5:	Tyler.Mehler@minnow.ca	X	X	X
Email 6:	Hannah.Penner@Teck.com	X	X	X
PO number	VPO00818999			

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Trich ID	Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	Filt.	PRESERV.	ANALYSIS	Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
379	RG_LILC3_INV-2_2022-09-08_N	RG_LILC3	TA		8-Sep-22	11:15	INV	Composite	Composite				1	X	X	X
380	RG_LILC3_INV-3_2022-09-08_N	RG_LILC3	TA		8-Sep-22	13:28	INV	Composite	Composite				1	X	X	X
381	RG_LILC3_INV-4_2022-09-08_N	RG_LILC3	TA		8-Sep-22	14:38	INV	Composite	Composite				1	X	X	X
382	RG_LILC3_INV-5_2022-09-08_N	RG_LILC3	TA		8-Sep-22	14:56	INV	Composite	Composite				1	X	X	X
383	RG_LISP24_INV-2_2022-09-15_N	RG_LISP24	TA		15-Sep-22	9:12	INV	Composite	Composite				1	X	X	X
384	RG_LISP24_INV-1_2022-09-14_N	RG_LISP24	TA		14-Sep-22	15:23	INV	Composite	Composite				1	X	X	X
385	RG_LISP24_INV-4_2022-09-15_N	RG_LISP24	TA		15-Sep-22	9:45	INV	Composite	Composite				1	X	X	X
386	RG_LISP24_INV-5_2022-09-15_N	RG_LISP24	TA		15-Sep-22	9:58	INV	Composite	Composite				1	X	X	X
387	RG_SLINE_INV-1_2022-09-16_N	RG_SLINE	TA		16-Sep-22	10:15	INV	Composite	Composite				1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
PO 818999	Jennifer Ings	##########	Alex Wade	21Sep2022 / 14:57
				(Project # 2022-401)

SERVICE REQUEST (rush - subject to availability)

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For Emergency <1 Day, ASAP or Weekend

Sampler's Name	Jennifer Ings	Mobile #	5195003444
Sampler's Signature		Date/Time	September 19, 2022

Teck

COC ID: REP_LAEMP_LCO_2022-09_TRICH

TURNAROUND TIME:

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	TrichAnalytics Inc.			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Jennie Christensen			Email 1:	AquaSciLab@Teck.com	X	X	X
Email	Cybele.Heddle@teck.com			Email	jennie.christensen@trichanalytics			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	207-1753 Sean Heights			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	Lisa.Bowron@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Saanichton	Province	BC	Email 5:	Tyler.Mehler@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code				Email 6:	Hannah.Penner@Teck.com	X	X	X
Phone Number	1-250-865-3048			Phone Number				PO number	VPO00818999			

SAMPLE DETAILS — **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Trich ID	Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	Filt.	PRESERV.	ANALYSIS	Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
388	RG_SLINE_INV-2_2022-09-16_N	RG_SLINE	TA		16-Sep-22	10:50	INV	Composite	Composite				1	X	X	X
389	RG_SLINE_INV-3_2022-09-16_N	RG_SLINE	TA		16-Sep-22	11:22	INV	Composite	Composite				1	X	X	X
390	RG_SLINE_INV-4_2022-09-16_N	RG_SLINE	TA		16-Sep-22	13:25	INV	Composite	Composite				1	X	X	X
391	RG_SLINE_INV-5_2022-09-16_N	RG_SLINE	TA		16-Sep-22	13:45	INV	Composite	Composite				1	X	X	X
392	RG_LISP24_INV-3_2022-09-15_N	RG_LISP24	TA		15-Sep-22	9:27	INV	Composite	Composite				1	X	X	X
393	RG_LI24_INV-1_2022-09-17_N	RG_LI24	TA		17-Sep-22	9:10	INV	Composite	Composite				1	X	X	X
394	RG_LI24_INV-2_2022-09-17_N	RG_LI24	TA		17-Sep-22	9:50	INV	Composite	Composite				1	X	X	X
395	RG_LI24_INV-3_2022-09-17_N	RG_LI24	TA		17-Sep-22	10:45	INV	Composite	Composite				1	X	X	X
396	RG_LI24_INV-4_2022-09-17_N	RG_LI24	TA		17-Sep-22	11:45	INV	Composite	Composite				1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
PO 818999	Jennifer Ings	##########	Alex Wade	21 Sep 2022 / 14:57
				(Project # 2022-401)

SERVICE REQUEST (rush - subject to availability)

Regular (default)
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For Emergency <1 Day, ASAP or Weekend

Sampler's Name	Jennifer Ings	Mobile #	5195003444
Sampler's Signature		Date/Time	September 19, 2022

Teck

COC ID: REP_LAEMP_LCO_2022-09_TRICH

TURNAROUND TIME:

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name / Job#	Regional Effects Program			Lab Name	TrichAnalytics Inc.			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Jennie Christensen			Email 1:	AquaSciLab@Teck.com	X	X	X
Email	Cybele.Heddle@teck.com			Email	jennie.christensen@trichanalytics			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Ave			Address	207-1753 Sean Heights			Email 3:	Teck.Lab.Results@teck.com	X	X	X
								Email 4:	Lisa.Bowron@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Saanichton	Province	BC	Email 5:	Tyler.Mehler@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code				Email 6:	Hannah.Penner@Teck.com	X	X	X
Phone Number	1-250-865-3048			Phone Number				PO number	VPO00818999			

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Index ID	Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	ANALYSIS	Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
	Filt.													
	PRESERV.													
397	RG_LI24_INV-5_2022-09-17_N	RG_LI24	TA		17-Sep-22	12:30	INV	Composite	Composite		1	X	X	X
398	RG_LI8_INV-1_2022-09-17_N	RG_LI8	TA		17-Sep-22	14:30	INV	Composite	Composite		1	X	X	X
399	RG_LI8_INV-2_2022-09-17_N	RG_LI8	TA		17-Sep-22	15:00	INV	Composite	Composite		1	X	X	X
400	RG_LI8_INV-3_2022-09-17_N	RG_LI8	TA		17-Sep-22	15:23	INV	Composite	Composite		1	X	X	X
401	RG_LI8_INV-4_2022-09-17_N	RG_LI8	TA		17-Sep-22	15:30	INV	Composite	Composite		1	X	X	X
402	RG_LI8_INV-5_2022-09-17_N	RG_LI8	TA		17-Sep-22	15:47	INV	Composite	Composite		1	X	X	X
											1	X	X	X
											1	X	X	X
											1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
PO 818999	Jennifer Ings	##########	Alex Wade	21Sep2022 / 14:57
				(Project #: 2022-401)

SERVICE REQUEST (rush - subject to availability)

Regular (default)
Priority (2-3 business days) - 50% surcharge
Emergency (1 Business Day) - 100% surcharge
For Emergency <1 Day, ASAP or Weekend

Sampler's Name	Jennifer Ings	Mobile #	5195003444
Sampler's Signature		Date/Time	September 19, 2022

BENTHIC TISSUE CHEMISTRY

TrichAnalytics Laboratory Report 2022-453

(Finalized January 12, 2023)

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Cybele Heddle
Project Manager
Teck Coal Limited
Phone: 250-910-8755
Email: cybele.heddle@teck.com; rhiannon.hodgson@minnow.ca; nicole.zathey@teck.com; hannah.penner@teck.com; kbatchelar@minnow.ca; teckcoal@equisonline.com; aquascilab@teck.com; teck.lab.results@teck.com

Date Received: 05 Jan 2023
Date of Analysis: 11 Jan 2023
Final Report Date: 12 Jan 2023
Project No.: 2023-453
Method No.: MET-002.06

Client Project: December 2022 LCO LAEMP Regional Effects Program (PO: TBD)

Analytical Request: Composite Benthic Invertebrate Tissue Microchemistry (total metals & moisture) - 40 samples. See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in parts per million (ppm) dry weight (equivalent to mg/kg).
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.
Client specific DQO for Selenium accuracy is 90-110% of the certified value; result achieved 100% (ranging from 92-109%).

All Client sample IDs were updated and differ from the COC where "BIT" was changed to read "INV" in this report.

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio — 12 Jan 2023 (Date)

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LISP24_INV-1_2022-12_N	RG_LISP24_INV-2_2022-12_N	RG_LISP24_INV-3_2022-12_N	RG_LISP24_INV-4_2022-12_N	RG_LISP24_INV-5_2022-12_N
		Lab ID	004	005	006	007	008
		Wet Weight (g)	2.7913	1.0849	1.9874	2.3635	2.0488
		Dry Weight (g)	0.6056	0.2204	0.4160	0.5001	0.4746
		Moisture (%)	78.3	79.7	79.1	78.8	76.8
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.044	0.147	0.801	0.505	0.474	0.261	0.809
11B	0.132	0.440	2.9	1.9	1.1	2.3	3.4
23Na	9.4	31	7,020	3,899	3,584	3,091	7,786
24Mg	0.127	0.423	2,139	1,298	1,272	880	2,153
27Al	0.073	0.243	322	300	223	124	353
31P	126	420	20,141	13,028	13,910	8,689	20,673
39K	5.4	18	15,426	10,029	7,933	6,911	16,226
44Ca	25	83	3,815	2,230	1,931	1,808	2,885
49Ti	0.001	0.003	25	19	15	7.2	29
51V	0.029	0.097	1.0	0.602	0.559	0.357	1.1
52Cr	0.097	0.323	5.6	4.1	2.9	3.0	5.1
55Mn	0.014	0.047	348	299	289	154	440
57Fe	0.952	3.2	900	652	487	375	1,069
59Co	0.017	0.057	5.8	3.9	3.6	2.4	6.4
60Ni	0.082	0.273	31	23	15	16	35
63Cu	0.019	0.063	36	20	14	18	28
66Zn	0.247	0.823	464	292	276	178	459
75As	0.365	1.2	1.6	1.1	0.808	1.2	1.7
77Se	0.385	1.3	12	7.0	6.2	6.3	12
88Sr	0.001	0.003	5.9	5.6	3.7	2.8	5.8
95Mo	0.001	0.003	0.653	0.399	0.290	0.254	0.580
107Ag	0.001	0.003	0.037	0.028	0.009	0.019	0.028
111Cd	0.181	0.603	7.6	7.0	7.7	3.1	7.3
118Sn	0.022	0.073	1.1	1.0	0.637	0.488	1.1
121Sb	0.005	0.017	0.135	0.080	0.052	0.053	0.118
137Ba	0.001	0.003	34	39	24	13	44
202Hg	0.025	0.083	0.142	0.115	0.110	0.079	0.136
205Tl	0.001	0.003	0.058	0.036	0.030	0.018	0.051
208Pb	0.004	0.013	0.266	0.260	0.145	0.088	0.274
238U	0.001	0.003	0.128	0.098	0.071	0.048	0.145

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LIDSL_INV-1_2022-12_N	RG_LIDSL_INV-2_2022-12_N	RG_LIDSL_INV-3_2022-12_N	RG_LIDSL_INV-4_2022-12_N	RG_LIDSL_INV-5_2022-12_N
		Lab ID	009	010	011	012	013
		Wet Weight (g)	1.2583	1.5793	1.7288	1.6647	2.0339
		Dry Weight (g)	0.2137	0.3301	0.3540	0.3726	0.4547
		Moisture (%)	83.0	79.1	79.5	77.6	77.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.044	0.147	0.614	0.809	0.326	0.566	0.400
11B	0.132	0.440	2.4	2.1	0.901	2.4	1.1
23Na	9.4	31	3,800	5,470	3,531	4,375	3,491
24Mg	0.127	0.423	1,982	1,584	1,037	1,544	977
27Al	0.073	0.243	442	424	323	305	271
31P	126	420	12,040	14,460	10,747	13,568	12,166
39K	5.4	18	9,030	10,763	7,634	9,613	8,366
44Ca	25	83	4,484	2,804	1,492	2,528	1,809
49Ti	0.001	0.003	33	38	15	21	17
51V	0.029	0.097	0.797	0.905	0.530	0.738	0.532
52Cr	0.097	0.323	5.5	5.5	2.0	3.7	3.2
55Mn	0.014	0.047	229	312	166	215	252
57Fe	0.952	3.2	654	591	251	487	375
59Co	0.017	0.057	2.9	3.5	2.5	2.5	3.2
60Ni	0.082	0.273	23	23	14	19	17
63Cu	0.019	0.063	27	18	13	20	16
66Zn	0.247	0.823	620	315	266	324	294
75As	0.365	1.2	0.923	0.962	0.596	0.846	0.769
77Se	0.385	1.3	8.5	7.5	6.2	8.7	6.6
88Sr	0.001	0.003	7.0	4.9	2.7	4.8	3.1
95Mo	0.001	0.003	0.435	0.435	0.254	0.326	0.363
107Ag	0.001	0.003	0.047	0.028	0.019	0.038	0.019
111Cd	0.181	0.603	10	7.0	6.2	4.4	5.7
118Sn	0.022	0.073	0.925	0.869	0.352	0.495	0.472
121Sb	0.005	0.017	0.059	0.074	0.037	0.071	0.048
137Ba	0.001	0.003	35	34	17	26	22
202Hg	0.025	0.083	0.115	0.110	0.089	0.126	0.084
205Tl	0.001	0.003	0.055	0.045	0.024	0.037	0.025
208Pb	0.004	0.013	0.295	0.298	0.097	0.210	0.117
238U	0.001	0.003	0.141	0.145	0.075	0.076	0.077

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LIDCOM_INV-1_2022-12_N	RG_LIDCOM_INV-2_2022-12_N	RG_LIDCOM_INV-3_2022-12_N	RG_LIDCOM_INV-4_2022-12_N	RG_LIDCOM_INV-5_2022-12_N
		Lab ID	014	015	016	017	018
		Wet Weight (g)	3.3246	1.7412	2.0587	2.6986	1.5305
		Dry Weight (g)	0.7578	0.4041	0.4341	0.5326	0.3306
		Moisture (%)	77.2	76.8	78.9	80.3	78.4
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.044	0.147	0.435	0.265	0.888	0.435	0.474
11B	0.132	0.440	1.1	0.751	3.0	1.1	1.6
23Na	9.4	31	3,850	2,861	3,349	4,041	3,291
24Mg	0.127	0.423	1,201	1,169	1,288	932	962
27Al	0.073	0.243	221	132	1,123	227	499
31P	126	420	15,944	10,476	11,414	10,819	9,941
39K	5.4	18	9,108	6,431	8,025	8,526	7,148
44Ca	25	83	2,353	957	1,626	1,520	2,291
49Ti	0.001	0.003	14	7.2	91	15	36
51V	0.029	0.097	0.432	0.230	2.0	0.413	0.821
52Cr	0.097	0.323	3.3	2.7	5.2	3.1	3.8
55Mn	0.014	0.047	102	91	172	99	114
57Fe	0.952	3.2	201	127	688	221	312
59Co	0.017	0.057	0.955	0.525	1.5	0.976	1.7
60Ni	0.082	0.273	12	5.6	20	13	13
63Cu	0.019	0.063	11	10	10	9.9	11
66Zn	0.247	0.823	242	180	229	191	267
75As	0.365	1.2	0.519	0.442	0.846	0.423	0.615
77Se	0.385	1.3	4.6	5.8	5.0	4.8	5.5
88Sr	0.001	0.003	3.5	2.1	5.6	2.3	4.0
95Mo	0.001	0.003	0.363	0.181	0.363	0.236	0.217
107Ag	0.001	0.003	0.028	0.019	0.038	0.019	0.019
111Cd	0.181	0.603	1.7	1.1	3.5	1.9	4.8
118Sn	0.022	0.073	0.248	0.173	0.304	0.290	0.352
121Sb	0.005	0.017	0.030	0.023	0.075	0.039	0.041
137Ba	0.001	0.003	19	14	47	15	25
202Hg	0.025	0.083	0.068	0.073	0.079	0.063	0.100
205Tl	0.001	0.003	0.026	0.019	0.045	0.024	0.035
208Pb	0.004	0.013	0.132	0.065	0.607	0.176	0.230
238U	0.001	0.003	0.071	0.021	0.139	0.053	0.083

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_SLINE_INV-1_2022-12_N	RG_SLINE_INV-2_2022-12_N	RG_SLINE_INV-3_2022-12_N	RG_SLINE_INV-4_2022-12_N	RG_SLINE_INV-5_2022-12_N
		Lab ID	019	020	021	022	023
		Wet Weight (g)	1.8345	1.8630	1.0739	1.4983	1.0381
		Dry Weight (g)	0.3251	0.3785	0.1865	0.2466	0.1959
		Moisture (%)	82.3	79.7	82.6	83.5	81.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.044	0.147	0.383	0.235	0.320	0.256	0.209
11B	0.132	0.440	0.801	0.601	1.5	0.863	0.839
23Na	9.4	31	5,776	4,144	4,658	4,010	3,341
24Mg	0.127	0.423	1,312	1,292	1,449	1,447	1,307
27Al	0.073	0.243	167	145	263	247	247
31P	126	420	12,814	13,566	16,422	13,014	10,655
39K	5.4	18	8,848	8,913	10,016	8,607	7,138
44Ca	25	83	1,609	2,016	2,673	1,810	2,448
49Ti	0.001	0.003	18	19	16	15	11
51V	0.029	0.097	0.547	0.647	0.967	0.659	0.826
52Cr	0.097	0.323	2.4	2.3	4.3	2.5	2.3
55Mn	0.014	0.047	26	21	34	29	20
57Fe	0.952	3.2	133	113	182	145	148
59Co	0.017	0.057	0.265	0.223	0.586	0.395	0.407
60Ni	0.082	0.273	3.1	2.9	7.4	3.6	4.4
63Cu	0.019	0.063	11	13	15	13	13
66Zn	0.247	0.823	347	328	436	426	460
75As	0.365	1.2	0.846	0.808	1.2	0.858	1.0
77Se	0.385	1.3	7.2	7.2	8.2	7.9	7.5
88Sr	0.001	0.003	3.2	4.6	6.5	4.2	5.5
95Mo	0.001	0.003	0.290	0.326	0.303	0.303	0.303
107Ag	0.001	0.003	0.066	0.085	0.084	0.059	0.067
111Cd	0.181	0.603	2.7	2.8	6.1	4.4	6.6
118Sn	0.022	0.073	0.535	0.256	0.773	0.596	0.543
121Sb	0.005	0.017	0.020	0.024	0.043	0.024	0.029
137Ba	0.001	0.003	17	21	24	15	15
202Hg	0.025	0.083	0.100	0.115	0.121	0.124	0.116
205Tl	0.001	0.003	0.076	0.071	0.116	0.100	0.114
208Pb	0.004	0.013	0.151	0.109	0.229	0.147	0.128
238U	0.001	0.003	0.103	0.116	0.178	0.112	0.121

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LI24_INV-1_2022-12_N	RG_LI24_INV-2_2022-12_N	RG_LI24_INV-3_2022-12_N	RG_LI24_INV-4_2022-12_N	RG_LI24_INV-5_2022-12_N
		Lab ID	024	025	026	027	028
		Wet Weight (g)	1.2996	1.5606	1.7365	1.7965	1.0560
		Dry Weight (g)	0.2428	0.3157	0.3459	0.3545	0.2212
		Moisture (%)	81.3	79.8	80.1	80.3	79.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.044	0.147	0.290	0.239	0.137	0.162	0.281
11B	0.132	0.440	0.623	0.767	0.431	0.479	0.601
23Na	9.4	31	3,665	4,341	3,293	3,755	3,114
24Mg	0.127	0.423	1,151	1,344	976	1,097	1,062
27Al	0.073	0.243	187	110	66	75	244
31P	126	420	12,484	14,773	11,820	11,506	10,615
39K	5.4	18	8,741	9,959	7,414	7,735	7,604
44Ca	25	83	2,640	2,816	1,510	2,259	3,257
49Ti	0.001	0.003	10	3.4	2.8	3.4	7.8
51V	0.029	0.097	1.3	1.1	0.865	1.1	1.3
52Cr	0.097	0.323	3.1	2.6	2.2	1.9	2.7
55Mn	0.014	0.047	16	13	16	11	15
57Fe	0.952	3.2	126	101	69	90	145
59Co	0.017	0.057	0.455	0.347	0.263	0.335	0.419
60Ni	0.082	0.273	6.0	5.7	3.9	4.8	6.1
63Cu	0.019	0.063	11	12	8.7	9.4	8.1
66Zn	0.247	0.823	324	224	213	225	227
75As	0.365	1.2	1.4	1.3	0.970	1.1	1.1
77Se	0.385	1.3	5.2	5.0	4.4	5.5	4.2
88Sr	0.001	0.003	6.1	5.8	3.4	5.5	7.9
95Mo	0.001	0.003	0.265	0.227	0.189	0.227	0.227
107Ag	0.001	0.003	0.042	0.027	0.025	0.034	0.034
111Cd	0.181	0.603	1.8	1.4	1.4	1.4	1.8
118Sn	0.022	0.073	0.783	0.410	0.395	0.474	0.569
121Sb	0.005	0.017	0.025	0.024	0.014	0.030	0.033
137Ba	0.001	0.003	12	11	15	11	18
202Hg	0.025	0.083	0.062	0.057	0.052	0.052	0.062
205Tl	0.001	0.003	0.054	0.044	0.044	0.053	0.053
208Pb	0.004	0.013	0.149	0.119	0.074	0.122	0.143
238U	0.001	0.003	0.091	0.070	0.053	0.087	0.102

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LCUT_INV-1_2022-12_N	RG_LCUT_INV-2_2022-12_N	RG_LCUT_INV-3_2022-12_N	RG_LCUT_INV-4_2022-12_N	RG_LCUT_INV-5_2022-12_N
		Lab ID	029	030	031	032	033
		Wet Weight (g)	1.7700	1.5704	2.2086	1.6728	1.5421
		Dry Weight (g)	0.3954	0.3171	0.4932	0.4041	0.3314
		Moisture (%)	77.7	79.8	77.7	75.8	78.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.044	0.147	0.495	0.636	0.529	0.555	0.572
11B	0.132	0.440	0.695	2.7	1.1	0.911	1.9
23Na	9.4	31	4,794	4,532	4,247	5,657	5,357
24Mg	0.127	0.423	994	1,418	1,089	1,097	1,268
27Al	0.073	0.243	171	304	354	282	382
31P	126	420	14,359	12,637	13,305	15,454	14,227
39K	5.4	18	10,081	9,673	8,866	12,343	11,606
44Ca	25	83	1,386	3,495	1,561	1,673	3,450
49Ti	0.001	0.003	12	38	19	14	20
51V	0.029	0.097	0.317	1.1	0.659	0.668	0.770
52Cr	0.097	0.323	2.4	5.0	2.6	2.5	3.1
55Mn	0.014	0.047	27	22	20	30	21
57Fe	0.952	3.2	109	299	146	153	184
59Co	0.017	0.057	0.586	1.0	0.748	0.814	0.993
60Ni	0.082	0.273	5.5	13	6.9	6.6	11
63Cu	0.019	0.063	23	28	20	27	21
66Zn	0.247	0.823	160	211	164	228	175
75As	0.365	1.2	0.821	2.6	1.4	1.8	1.4
77Se	0.385	1.3	5.2	4.7	5.4	5.3	4.7
88Sr	0.001	0.003	1.9	4.5	2.3	2.6	4.8
95Mo	0.001	0.003	0.246	0.265	0.340	0.378	0.227
107Ag	0.001	0.003	0.017	0.025	0.017	0.025	0.017
111Cd	0.181	0.603	3.6	4.9	3.3	6.0	4.0
118Sn	0.022	0.073	0.217	0.422	0.193	0.167	0.454
121Sb	0.005	0.017	0.033	0.068	0.047	0.040	0.055
137Ba	0.001	0.003	16	24	22	27	21
202Hg	0.025	0.083	0.171	0.165	0.158	0.191	0.124
205Tl	0.001	0.003	0.033	0.043	0.042	0.058	0.043
208Pb	0.004	0.013	0.262	0.472	0.326	0.405	0.365
238U	0.001	0.003	0.066	0.075	0.054	0.092	0.080

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LILC3_INV-1_2022-12_N	RG_LILC3_INV-2_2022-12_N	RG_LILC3_INV-3_2022-12_N	RG_LILC3_INV-4_2022-12_N	RG_LILC3_INV-5_2022-12_N
		Lab ID	034	035	036	037	038
		Wet Weight (g)	1.8205	1.6568	1.5899	0.8484	0.8683
		Dry Weight (g)	0.3737	0.3224	0.3281	0.1656	0.1798
		Moisture (%)	79.5	80.5	79.4	80.5	79.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.044	0.147	0.324	0.401	0.470	0.555	0.768
11B	0.132	0.440	0.743	0.671	1.0	1.6	3.3
23Na	9.4	31	3,710	3,816	4,751	4,496	4,271
24Mg	0.127	0.423	644	781	1,008	1,175	1,512
27Al	0.073	0.243	99	109	279	307	740
31P	126	420	9,411	11,779	14,241	12,655	12,692
39K	5.4	18	7,052	7,721	9,070	9,393	9,765
44Ca	25	83	685	1,027	1,566	3,348	7,982
49Ti	0.001	0.003	5.6	9.9	14	20	58
51V	0.029	0.097	0.329	0.522	0.770	1.3	2.2
52Cr	0.097	0.323	1.9	2.6	2.8	3.6	5.4
55Mn	0.014	0.047	176	224	346	423	675
57Fe	0.952	3.2	744	650	987	1,282	1,838
59Co	0.017	0.057	2.4	2.8	3.9	4.9	6.2
60Ni	0.082	0.273	9.3	12	15	22	37
63Cu	0.019	0.063	11	8.0	14	14	15
66Zn	0.247	0.823	108	111	206	173	282
75As	0.365	1.2	0.709	0.597	0.970	1.1	1.6
77Se	0.385	1.3	8.9	7.8	7.7	7.2	10
88Sr	0.001	0.003	1.4	2.0	3.5	5.3	11
95Mo	0.001	0.003	0.227	0.303	0.378	0.530	0.677
107Ag	0.001	0.003	<0.001	0.008	0.008	0.017	0.022
111Cd	0.181	0.603	2.0	2.5	4.7	4.9	7.7
118Sn	0.022	0.073	0.361	0.464	0.735	1.2	1.3
121Sb	0.005	0.017	0.062	0.071	0.083	0.124	0.200
137Ba	0.001	0.003	13	19	29	42	83
202Hg	0.025	0.083	0.062	0.083	0.098	0.109	0.088
205Tl	0.001	0.003	0.079	0.058	0.077	0.084	0.171
208Pb	0.004	0.013	0.112	0.167	0.292	0.331	0.573
238U	0.001	0.003	0.058	0.062	0.112	0.102	0.251

Notes:

ppm = parts per million

DL = detection limit

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FRUL_INV-1_2022-12_N	RG_FRUL_INV-2_2022-12_N	RG_FRUL_INV-3_2022-12_N	RG_FRUL_INV-4_2022-12_N	RG_FRUL_INV-5_2022-12_N
		Lab ID	039	040	041	042	043
		Wet Weight (g)	1.2275	0.9060	1.7511	0.9375	2.0801
		Dry Weight (g)	0.2193	0.1487	0.3255	0.1674	0.3507
		Moisture (%)	82.1	83.6	81.4	82.1	83.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.044	0.147	0.262	0.337	0.399	0.346	0.523
11B	0.132	0.440	0.855	1.5	0.507	0.824	0.507
23Na	9.4	31	3,248	1,799	4,602	4,654	5,310
24Mg	0.127	0.423	1,202	2,052	1,584	1,280	1,568
27Al	0.073	0.243	199	290	82	279	73
31P	126	420	9,773	10,374	11,138	11,679	13,415
39K	5.4	18	6,674	3,351	6,706	9,199	7,773
44Ca	25	83	3,550	9,069	2,721	2,904	3,328
49Ti	0.001	0.003	16	26	5.3	20	5.3
51V	0.029	0.097	0.460	0.510	0.164	0.464	0.159
52Cr	0.097	0.323	3.8	5.8	2.5	4.6	2.4
55Mn	0.014	0.047	29	37	34	33	28
57Fe	0.952	3.2	219	247	117	215	114
59Co	0.017	0.057	0.557	0.433	0.396	0.644	0.384
60Ni	0.082	0.273	5.0	6.4	3.1	6.7	2.4
63Cu	0.019	0.063	20	20	15	22	17
66Zn	0.247	0.823	440	437	280	472	370
75As	0.365	1.2	0.396	0.440	<0.365	0.528	<0.365
77Se	0.385	1.3	9.7	9.0	9.5	11	9.5
88Sr	0.001	0.003	3.8	11	3.0	3.2	3.5
95Mo	0.001	0.003	0.193	0.242	0.193	0.242	0.145
107Ag	0.001	0.003	0.216	0.259	0.151	0.238	0.162
111Cd	0.181	0.603	1.4	1.2	1.5	2.0	1.1
118Sn	0.022	0.073	0.386	0.485	0.344	0.421	0.297
121Sb	0.005	0.017	0.034	0.041	0.026	0.032	0.014
137Ba	0.001	0.003	21	51	16	20	20
202Hg	0.025	0.083	0.065	0.082	0.059	0.076	0.071
205Tl	0.001	0.003	0.017	0.020	0.014	0.027	0.014
208Pb	0.004	0.013	0.128	0.109	0.076	0.146	0.052
238U	0.001	0.003	0.037	0.059	0.031	0.043	0.019

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_LISP24_INV-1_2022-12_N			RG_SLINE_INV-3_2022-12_N			RG_LCUT_INV-1_2022-12_N		
Lab ID		004			021			029		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.044	0.801	0.818	2.1	0.320	0.354	-	0.495	0.581	16
11B	0.132	2.9	2.9	0.0	1.5	1.3	-	0.695	0.767	-
23Na	9.4	7,020	7,517	6.8	4,658	5,456	16	4,794	4,892	2.0
24Mg	0.127	2,139	1,989	7.3	1,449	1,471	1.5	994	1,087	8.9
27Al	0.073	322	362	12	263	360	31	171	237	32
31P	126	20,141	20,784	3.1	16,422	15,768	4.1	14,359	14,518	1.1
39K	5.4	15,426	17,535	13	10,016	11,545	14	10,081	9,439	6.6
44Ca	25	3,815	2,936	26	2,673	2,969	11	1,386	1,254	10
49Ti	0.001	25	32	25	16	19	17	12	14	15
51V	0.029	1.0	0.960	4.1	0.967	1.1	13	0.317	0.419	28
52Cr	0.097	5.6	4.8	15	4.3	4.6	6.7	2.4	2.3	4.3
55Mn	0.014	348	344	1.2	34	40	16	27	21	25
57Fe	0.952	900	838	7.1	182	222	20	109	123	12
59Co	0.017	5.8	5.2	11	0.586	0.556	5.3	0.586	0.515	13
60Ni	0.082	31	31	0.0	7.4	7.9	6.5	5.5	5.2	5.6
63Cu	0.019	36	31	15	15	16	6.5	23	18	24
66Zn	0.247	464	365	24	436	446	2.3	160	152	5.1
75As	0.365	1.6	1.3	-	1.2	1.2	-	0.821	0.840	-
77Se	0.385	12	12	0.0	8.2	8.3	1.2	5.2	5.7	9.2
88Sr	0.001	5.9	4.8	21	6.5	6.1	6.3	1.9	2.1	10
95Mo	0.001	0.653	0.580	12	0.303	0.340	12	0.246	0.227	8.0
107Ag	0.001	0.037	0.038	2.7	0.084	0.084	0.0	0.017	0.017	0.0
111Cd	0.181	7.6	5.7	29	6.1	5.6	8.5	3.6	2.9	22
118Sn	0.022	1.1	1.1	0.0	0.773	0.739	4.5	0.217	0.183	-
121Sb	0.005	0.135	0.114	17	0.043	0.043	-	0.033	0.048	-
137Ba	0.001	34	35	2.9	24	33	32	16	17	6.1
202Hg	0.025	0.142	0.121	-	0.121	0.134	-	0.171	0.163	-
205Tl	0.001	0.058	0.052	11	0.116	0.114	1.7	0.033	0.037	11
208Pb	0.004	0.266	0.242	9.4	0.229	0.232	1.3	0.262	0.226	15
238U	0.001	0.128	0.125	2.4	0.178	0.168	5.8	0.066	0.059	11

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID	RG_LILC3_INV-5_2022-12_N
Lab ID	038

Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.044	0.768	0.692	10
11B	0.132	3.3	3.8	14
23Na	9.4	4,271	4,271	0.0
24Mg	0.127	1,512	1,504	0.5
27Al	0.073	740	579	25
31P	126	12,692	11,775	7.5
39K	5.4	9,765	9,031	7.8
44Ca	25	7,982	8,945	11
49Ti	0.001	58	42	10
51V	0.029	2.2	1.6	32
52Cr	0.097	5.4	4.8	12
55Mn	0.014	675	633	6.4
57Fe	0.952	1,838	1,453	23
59Co	0.017	6.2	7.0	12
60Ni	0.082	37	43	15
63Cu	0.019	15	16	6.5
66Zn	0.247	282	227	22
75As	0.365	1.6	1.6	-
77Se	0.385	10	11	9.5
88Sr	0.001	11	13	17
95Mo	0.001	0.677	0.628	7.5
107Ag	0.001	0.022	0.022	0.0
111Cd	0.181	7.7	6.8	12
118Sn	0.022	1.3	1.0	26
121Sb	0.005	0.200	0.204	2.0
137Ba	0.001	83	95	14
202Hg	0.025	0.088	0.100	-
205Tl	0.001	0.171	0.136	23
208Pb	0.004	0.573	0.418	31
238U	0.001	0.251	0.234	7.0

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	01			02	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.044	1.21	1.3	107	0.0	1.2	96	4.7
11B	0.132	4.5	4.5	101	3.3	4.0	90	2.8
23Na	9.4	14,000	15,177	108	8.9	12,723	91	2.8
24Mg	0.127	910	976	107	8.7	879	97	3.4
27Al	0.073	197.2	193	98	4.0	199	101	6.5
31P	126	8,000	8,545	107	8.3	7,216	90	2.9
39K	5.4	15,500	16,941	109	13	14,713	95	4.0
44Ca	25	2,360	2,517	107	4.0	2,174	92	3.6
49Ti	0.001	12.24	12	98	13	11	86	6.4
51V	0.029	1.57	1.7	106	9.1	1.6	99	5.7
52Cr	0.097	1.87	2.1	112	4.8	1.9	100	2.4
55Mn	0.014	3.17	3.8	119	7.6	3.2	100	6.0
57Fe	0.952	343	368	107	3.4	347	101	5.2
59Co	0.017	0.25	0.284	114	5.2	0.265	106	6.2
60Ni	0.082	1.34	1.6	116	3.5	1.4	104	5.1
63Cu	0.019	15.7	17	107	2.7	15	97	2.9
66Zn	0.247	51.6	57	110	4.1	47	90	2.4
75As	0.365	6.87	7.1	104	2.3	6.2	90	4.1
77Se	0.385	3.45	3.8	109	4.1	3.2	92	11
88Sr	0.001	10.1	11	111	7.5	9.0	89	5.1
95Mo	0.001	0.29	0.297	102	10	0.238	82	7.1
107Ag	0.001	0.0252	0.030	119	15	0.022	86	20
111Cd	0.181	0.299	0.370	124	8.6	0.319	107	17
118Sn	0.022	0.061	0.078	127	11	0.058	95	9.9
121Sb	0.005	0.011	0.013	116	14	0.010	88	12
137Ba	0.001	8.6	8.6	100	5.5	8.0	94	3.6
202Hg	0.025	0.412	0.459	111	3.2	0.414	100	4.4
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.004	0.404	0.461	114	8.6	0.400	99	7.3
238U	0.001	0.05	0.054	108	5.4	0.047	95	6.8

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

Sample Group ID			03		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.044	1.21	1.1	89	7.7
11B	0.132	4.5	4.3	96	4.1
23Na	9.4	14,000	13,539	97	4.8
24Mg	0.127	910	865	95	8.2
27Al	0.073	197.2	198	100	9.4
31P	126	8,000	7,567	95	5.0
39K	5.4	15,500	14,899	96	7.0
44Ca	25	2,360	2,335	99	2.1
49Ti	0.001	12.24	13	106	16
51V	0.029	1.57	1.5	96	6.7
52Cr	0.097	1.87	1.9	100	2.9
55Mn	0.014	3.17	3.0	93	5.1
57Fe	0.952	343	345	100	3.2
59Co	0.017	0.25	0.237	95	8.3
60Ni	0.082	1.34	1.3	97	7.7
63Cu	0.019	15.7	15	97	5.5
66Zn	0.247	51.6	48	94	2.4
75As	0.365	6.87	6.7	98	2.7
77Se	0.385	3.45	3.5	100	6.3
88Sr	0.001	10.1	9.5	94	4.7
95Mo	0.001	0.29	0.290	100	0.0
107Ag	0.001	0.0252	0.024	95	19
111Cd	0.181	0.299	0.272	91	12
118Sn	0.022	0.061	0.053	88	6.6
121Sb	0.005	0.011	0.011	102	7.5
137Ba	0.001	8.6	8.6	100	2.7
202Hg	0.025	0.412	0.371	90	12
205Tl	0.001	0.0013	-	-	-
208Pb	0.004	0.404	0.321	80	4.4
238U	0.001	0.05	0.046	91	10

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_LISP24_INV-1_2022-12_N	004	11 Jan 2023
	RG_LISP24_INV-2_2022-12_N	005	
	RG_LISP24_INV-3_2022-12_N	006	
	RG_LISP24_INV-4_2022-12_N	007	
	RG_LISP24_INV-5_2022-12_N	008	
	RG_LIDSL_INV-1_2022-12_N	009	
	RG_LIDSL_INV-2_2022-12_N	010	
	RG_LIDSL_INV-3_2022-12_N	011	
	RG_LIDSL_INV-4_2022-12_N	012	
	RG_LIDSL_INV-5_2022-12_N	013	
	RG_LIDCOM_INV-1_2022-12_N	014	
	RG_LIDCOM_INV-2_2022-12_N	015	
	RG_LIDCOM_INV-3_2022-12_N	016	
	RG_LIDCOM_INV-4_2022-12_N	017	
	RG_LIDCOM_INV-5_2022-12_N	018	
	RG_SLINE_INV-1_2022-12_N	019	
	RG_SLINE_INV-2_2022-12_N	020	
02	RG_SLINE_INV-3_2022-12_N	021	11 Jan 2023
	RG_SLINE_INV-4_2022-12_N	022	
	RG_SLINE_INV-5_2022-12_N	023	
	RG_LI24_INV-1_2022-12_N	024	
	RG_LI24_INV-2_2022-12_N	025	
	RG_LI24_INV-3_2022-12_N	026	
	RG_LI24_INV-4_2022-12_N	027	
	RG_LI24_INV-5_2022-12_N	028	
	RG_LCUT_INV-1_2022-12_N	029	
	RG_LCUT_INV-2_2022-12_N	030	
	RG_LCUT_INV-3_2022-12_N	031	
	RG_LCUT_INV-4_2022-12_N	032	
	RG_LCUT_INV-5_2022-12_N	033	
	RG_LILC3_INV-1_2022-12_N	034	
	RG_LILC3_INV-2_2022-12_N	035	
	RG_LILC3_INV-3_2022-12_N	036	
	RG_LILC3_INV-4_2022-12_N	037	
03	RG_LILC3_INV-5_2022-12_N	038	11 Jan 2023
	RG_FRUL_INV-1_2022-12_N	039	
	RG_FRUL_INV-2_2022-12_N	040	
	RG_FRUL_INV-3_2022-12_N	041	
	RG_FRUL_INV-4_2022-12_N	042	
	RG_FRUL_INV-5_2022-12_N	043	

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GoL 06Jan2023

COC ID: December 2022 LCO LAEMP

TURNAROUND TIME:

RUSH:

PROJECT/CLIENT INFO

Facility Name / Job#	Regional Effects Program
Project Manager	Cybele Heddle
Email	Cybele.Heddle@teck.com
Address	421 Pine Ave
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Phone Number	250-910-8755

LABORATORY

Lab Name	TrichAnalytics Inc.
Lab Contact	Jennie Christensen
Email	jennie.christensen@trichanalytics
Address	207-1753 Sean Heights
City	Saanichton
Province	BC
Postal Code	
Phone Number	

OTHER INFO

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Email 2:	Rhiannon.Hodgson@minno	X	X	X
Email 3:	Nicole.Zathey@teck.com	X	X	X
Email 4:	Hannah.Penner@teck.com	X	X	X
Email 5:	Kbatchelar@minnow.ca	X	X	X

PO number: 818999

SAMPLE DETAILS / ANALYSIS REQUESTED

Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

Sample ID (Trich ID)	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	FIL	PRESERV.	ANALYSIS: Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
RG_LISP24_BIT-1_2022-12_N (004)	RG_LISP24	TA	NO	01-Dec-22	13:12	INV	Composite	Composite			1	X	X	X
RG_LISP24_BIT-2_2022-12_N (005)	RG_LISP24	TA	NO	01-Dec-22	13:30	INV	Composite	Composite			1	X	X	X
RG_LISP24_BIT-3_2022-12_N (006)	RG_LISP24	TA	NO	01-Dec-22	13:41	INV	Composite	Composite			1	X	X	X
RG_LISP24_BIT-4_2022-12_N (007)	RG_LISP24	TA	NO	01-Dec-22	13:56	INV	Composite	Composite			1	X	X	X
RG_LISP24_BIT-5_2022-12_N (008)	RG_LISP24	TA	NO	01-Dec-22	14:02	INV	Composite	Composite			1	X	X	X
RG_LIDSL_BIT-1_2022-12_N (009)	RG_LIDSL	TA	NO	29-Nov-22	13:46	INV	Composite	Composite			1	X	X	X
RG_LIDSL_BIT-2_2022-12_N (010)	RG_LIDSL	TA	NO	29-Nov-22	13:48	INV	Composite	Composite			1	X	X	X
RG_LIDSL_BIT-3_2022-12_N (011)	RG_LIDSL	TA	NO	29-Nov-22	14:08	INV	Composite	Composite			1	X	X	X
RG_LIDSL_BIT-4_2022-12_N (012)	RG_LIDSL	TA	NO	29-Nov-22	14:24	INV	Composite	Composite			1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

No samples collected for sample locations RG_LI8 and RG_FO23. PO 818999. samples labelled incorrectly. Please follow COC

RELINQUISHED BY/AFFILIATION

Rick Smit/Lotic Environmental

DATE/TIME: ##########

ACCEPTED BY/AFFILIATION

Geriene LaBine

DATE/TIME: 06Jan 2023/0900

(Project # 2023-453)

SERVICE REQUEST (rush - subject to availability)

- Regular (default)
- Priority (2-3 business days) - 50% surcharge
- Emergency (1 Business Day) - 100% surcharge
- For Emergency <1 Day, ASAP or Weekend

Sampler's Name	Rick Smit	Mobile #	403-586-3241
Sampler's Signature		Date/Time	December 27, 2022

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Page: 2 of 5

Rec'd 06 Jan 2023

COC ID: December 2022 LCO LAEMP

TURNAROUND TIME:

RUSH:

PROJECT/CLIENT INFO			
Facility Name / Job#	Regional Effects Program		
Project Manager	Cybele Heddle		
Email	Cybele.Heddle@teck.com		
Address	421 Pine Ave		
City	Sparwood	Province	BC
Postal Code	V0B 2G0		
Phone Number	250-910-8755		

LABORATORY			
Lab Name	TrichAnalytics Inc.		
Lab Contact	Jennie Christensen		
Email	jennie.christensen@trichanalytics		
Address	207-1753 Sean Heights		
City	Saanichton	Province	BC
Postal Code			
Phone Number			

OTHER INFO				
Report Format / Distribution		Excel	PDF	EDD
Email 1:	Cybele.Heddle@teck.com	X	X	X
Email 2:	Rhiannon.Hodgson@mirnng	X	X	X
Email 3:	Nicole.Zathey@teck.com	X	X	X
Email 4:	Hannah.Fenner@teck.com	X	X	X
Email 5:	Kbatchelar@minnow.ca	X	X	X
PO number	818999			

SAMPLE DETAILS / ANALYSIS REQUESTED

Filtered - F; Field - L; Lab - FL; Field & Lab - N; None

Sample ID	Trich ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	FIL	PRESERV.	ANALYSIS: Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
RG_LIDSL_BIT-5_2022-12_N	013	RG_LIDSL	TA	NO	29-Nov-22	14:29	INV	Composite	Composite			1	X	X	X
RG_LIDCOM_BIT-1_2022-12_N	014	RG_LIDCOM	TA	NO	01-Dec-22	14:28	INV	Composite	Composite			1	X	X	X
RG_LIDCOM_BIT-2_2022-12_N	015	RG_LIDCOM	TA	NO	01-Dec-22	15:00	INV	Composite	Composite			1	X	X	X
RG_LIDCOM_BIT-3_2022-12_N	016	RG_LIDCOM	TA	NO	01-Dec-22	15:16	INV	Composite	Composite			1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
No samples collected for sample locations RG_L18 and RG_FO23. PO 818999. samples labelled incorrectly. Please follow COC	Rick Smit/Lotic Environmental		Geneine LaBine	06 Jan 2023 / 0900
				(Project #: 2023-453)

SERVICE REQUEST (rush - subject to availability)
Regular (default)
Priority (2-3 business days) - 50% surcharge
Emergency (1 Business Day) - 100% surcharge
For Emergency <1 Day, ASAP or Weekend

Sampler's Name	Rick Smit	Mobile #	403-586-3241
Sampler's Signature		Date/Time	December 7, 2022

GOL 06Jan2023

Teck

COC ID: December 2022 LCO LAEMP

TURNAROUND TIME:

RUSH:

PROJECT/CLIENT INFO			
Facility Name / Job#	Regional Effects Program		
Project Manager	Cybele Heddle		
Email	Cybele.Heddle@teck.com		
Address	421 Pine Ave		
City	Sparwood	Province	BC
Postal Code	V0B 2G0		
Phone Number	250-910-8755		

LABORATORY			
Lab Name	TrichAnalytics Inc.		
Lab Contact	Jennie Christensen		
Email	jennie.christensen@trichanalytics		
Address	207-1753 Sean Heights		
City	Saanichton	Province	BC
Postal Code			
Phone Number			

OTHER INFO				
Report Format / Distribution		Excel	PDF	EDD
Email 1:	Cybele.Heddle@teck.com	X	X	X
Email 2:	Rhiannon.Hodgson@minno	X	X	X
Email 3:	Nicole.Zathey@teck.com	X	X	X
Email 4:	Hannah.Penner@teck.com	X	X	X
Email 5:	Kbatchelar@minnow.ca	X	X	X
PO number	818999			

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Trich ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	Filt.	PRESERV.	ANALYSIS: Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
RG_LIDCOM_BIT-4_2022-12_N	017	RG_LIDCOM	TA	NO	01-Dec-22	15:19	INV	Composite	Composite			1	X	X	X
RG_LIDCOM_BIT-5_2022-12_N	018	RG_LIDCOM	TA	NO	01-Dec-22	15:27	INV	Composite	Composite			1	X	X	X
RG_SLINE_BIT-1_2022-12_N	019	RG_SLINE	TA	NO	30-Nov-22	12:48	INV	Composite	Composite			1	X	X	X
RG_SLINE_BIT-2_2022-12_N	020	RG_SLINE	TA	NO	30-Nov-22	13:05	INV	Composite	Composite			1	X	X	X
RG_SLINE_BIT-3_2022-12_N	021	RG_SLINE	TA	NO	30-Nov-22	13:20	INV	Composite	Composite			1	X	X	X
RG_SLINE_BIT-4_2022-12_N	022	RG_SLINE	TA	NO	30-Nov-22	13:46	INV	Composite	Composite			1	X	X	X
RG_SLINE_BIT-5_2022-12_N	023	RG_SLINE	TA	NO	30-Nov-22	14:00	INV	Composite	Composite			1	X	X	X
RG_LI24_BIT-1_2022-12_N	024	RG_LI24	TA	NO	30-Nov-22	9:43	INV	Composite	Composite			1	X	X	X
RG_LI24_BIT-2_2022-12_N	025	RG_LI24	TA	NO	30-Nov-22	10:15	INV	Composite	Composite			1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

No samples collected for sample locations RG_LI8 and RG_FO23. PO 818999. samples labelled incorrectly. Please follow COC

	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Rick Smit/Lotic Environmental		Genene LaBine Cumming ZB	06Jan2023 / 0900
			(Project # 2023-453)

SERVICE REQUEST (rush - subject to availability)

Regular (default)
Priority (2-3 business days) - 50% surcharge
Emergency (1 Business Day) - 100% surcharge
For Emergency <1 Day, ASAP or Weekend

Sampler's Name	**Rick Smit**	**Mobile #**	**403-586-3241**
Sampler's Signature		**Date/Time**	**December 7, 2022**

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COC ID:	December 2022 LCO LAEMP	TURNAROUND TIME:		RUSH:

PROJECT/CLIENT INFO		LABORATORY		OTHER INFO			
Facility Name / Job#	Regional Effects Program	Lab Name	TrichAnalytics Inc.	Report Format / Distribution	Excel	PDF	EDD
Project Manager	Cybele Heddle	Lab Contact	Jennie Christensen	Email 1: Cybele.Heddle@teck.com	X	X	X
Email	Cybele.Heddle@teck.com	Email	jennie.christensen@trichanalytics	Email 2: Rhiannon.Hodgson@minnow	X	X	X
Address	421 Pine Ave	Address	207-1753 Sean Heights	Email 3: Nicole.Zathey@teck.com	X	X	X
				Email 4: Hannah.Fenner@teck.com	X	X	X
City	Sparwood, Province BC	City	Saanichton, Province BC	Email 5: Kbatchelar@minnow.ca	X	X	X
Postal Code	V0B 2G0	Postal Code					
Phone Number	250-910-8755	Phone Number		PO number	818999		

SAMPLE DETAILS / ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Trich ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure	Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry
RG_LI24_BIT-3_2022-12_N	026	RG_LI24	TA	NO	30-Nov-22	10:20	INV	Composite	Composite	1	X	X	X
RG_LI24_BIT-4_2022-12_N	027	RG_LI24	TA	NO	30-Nov-22	10:38	INV	Composite	Composite	1	X	X	X
RG_LI24_BIT-5_2022-12_N	028	RG_LI24	TA	NO	30-Nov-22	10:41	INV	Composite	Composite	1	X	X	X
RG_LCUT_BIT-1_2022-12_N	029	RG_LCUT	TA	NO	01-Dec-22	11:27	INV	Composite	Composite	1	X	X	X
RG_LCUT_BIT-2_2022-12_N	030	RG_LCUT	TA	NO	01-Dec-22	11:40	INV	Composite	Composite	1	X	X	X
RG_LCUT_BIT-3_2022-12_N	031	RG_LCUT	TA	NO	01-Dec-22	11:44	INV	Composite	Composite	1	X	X	X
RG_LCUT_BIT-4_2022-12_N	032	RG_LCUT	TA	NO	01-Dec-22	12:10	INV	Composite	Composite	1	X	X	X
RG_LCUT_BIT-5_2022-12_N	033	RG_LCUT	TA	NO	01-Dec-22	12:14	INV	Composite	Composite	1	X	X	X
RG_LILC3_BIT-1_2022-12_N	034	RG_LILC3	TA	NO	01-Dec-22	9:25	INV	Composite	Composite	1	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
No samples collected for sample locations RG_LI8 and RG_FO23. PO 818999, samples labelled incorrectly. Please follow COC	Rick Smit/Lotic Environmental		Gerriene LaBrie	06Jan2023 / 0900
				(Project # 2023-453)

SERVICE REQUEST (rush - subject to availability)				
Regular (default) Priority (2-3 business days) - 50% surcharge	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Emergency (1 Business Day) - 100% surcharge For Emergency <1 Day, ASAP or Weekend	Sampler's Signature		Date/Time	December 7, 2022

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COC ID: December 2022 LCO LAEMP

TURNAROUND TIME:

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	TrichAnalytics Inc.			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cybele Heddle			Lab Contact	Jennie Christensen			Email 1:	Cybele.Heddle@teck.com	X	X	X
Email	Cybele.Heddle@teck.com			Email	jennie.christensen@trichanalytics			Email 2:	Rhiannon.Hodgson@minno	X	X	X
Address	421 Pine Ave			Address	207-1753 Sean Heights			Email 3:	Nicole.Zathey@teck.com	X	X	X
								Email 4:	Hannah.Penner@teck.com	X	X	X
City	Sparwood	Province	BC	City	Saanichton	Province	BC	Email 5:	Kbatchelar@minnow.ca	X	X	X
Postal Code	V0B 2G0			Postal Code								
Phone Number	250-910-8755			Phone Number				PO number	818999			

SAMPLE DETAILS									ANALYSIS REQUESTED														Filtered - F: Field, L: Lab, FL: Field & Lab, N: None
									FIlt.														
									PRESERV.														
									ANALYSIS	Number of Containers	Metals in Biota by CRC ICPMS (wet and dry)	Mercury in Biota by CVAAS (wet, dry & routine)	Moisture Content by Gravimetry									
Sample ID	Trich ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	Tissue type	Tissue Species	Sample Structure														
RG_LILC3_BIT-2_2022-12_N	035	RG_LILC3	TA	NO	01-Dec-22	9:40	INV	Composite	Composite	1	X	X	X										
RG_LILC3_BIT-3_2022-12_N	036	RG_LILC3	TA	NO	01-Dec-22	10:14	INV	Composite	Composite	1	X	X	X										
RG_LILC3_BIT-4_2022-12_N	037	RG_LILC3	TA	NO	01-Dec-22	10:35	INV	Composite	Composite	1	X	X	X										
RG_LILC3_BIT-5_2022-12_N	038	RG_LILC3	TA	NO	01-Dec-22	10:46	INV	Composite	Composite	1	X	X	X										
RG_FRUL_BIT-1_2022-12_N	039	RG_FRUL	TA	NO	29-Nov-22	10:06	INV	Composite	Composite	1	X	X	X										
RG_FRUL_BIT-2_2022-12_N	040	RG_FRUL	TA	NO	29-Nov-22	11:13	INV	Composite	Composite	1	X	X	X										
RG_FRUL_BIT-3_2022-12_N	041	RG_FRUL	TA	NO	29-Nov-22	11:17	INV	Composite	Composite	1	X	X	X										
RG_FRUL_BIT-4_2022-12_N	042	RG_FRUL	TA	NO	29-Nov-22	11:52	INV	Composite	Composite	1	X	X	X										
RG_FRUL_BIT-5_2022-12_N	043	RG_FRUL	TA	NO	29-Nov-22	12:05	INV	Composite	Composite	1	X	X	X										

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
No samples collected for sample locations RG_LI8 and RG_FO23. PO 818999. samples labelled incorrectly. Please follow COC	Rick Smit/Lotic Environmental		Gerlenie LaBrie	06 Jan 2023 / 0900
				(Project #2023-453)

SERVICE REQUEST (rush - subject to availability)				
Regular (default)	Sampler's Name	Rick Smit	Mobile #	403-586-3241
Priority (2-3 business days) - 50% surcharge				
Emergency (1 Business Day) - 100% surcharge	Sampler's Signature		Date/Time	December 7, 2022
For Emergency <1 Day, ASAP or Weekend				